

FLIGHT

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Imperial Airways' Policy

THE policy of a flying company must be based on the technical advances in aircraft and engines, but, as these give, year by year, more reliability and more speed, much thought has to be taken on how best to employ the new powers. The speech of Sir Eric Geddes at the general meeting of Imperial Airways last Thursday was largely a discussion of this policy. For instance, the Empire services have hitherto been organised by dividing the routes into sections, each of which was operated by a separate fleet, with overhaul bases far away from the homeland. This was not economical but was dictated by the powers of the aircraft formerly in use. In the future the company intends to operate these long-distance routes with large flying boats which will be based on the United Kingdom and will fly right through to their distant termini. This, said Sir Eric, should make operation more economical. The shareholders and the taxpayer (to say nothing of the passengers and senders of letters) will benefit by those economies and should return thanks for them to the scientists and designers who have made them possible, not forgetting the directors of Imperial Airways, who have ordered aircraft which will make full use of modern discoveries. The designers would work in vain if the operators did not follow a policy which was bold and far-sighted as well as prudent.

Sir Eric did not make clear what is to be the exact route between London and the Mediterranean, but he did disclose that to cut out the train journey between Paris and Brindisi will actually be an economy. One has always thought of air transport as more costly than train travel, and it is certainly a surprise to learn that in the future it will actually be cheaper for the company to fly the whole way. The passengers will score in comfort and in saving of time. For this, too, thanks are due to the aircraft designers and the framers of the operating policy.

Speed is certainly the vexed question of the moment. We quite agree with Sir Eric that it is journey speed

which counts, not air speed. We also fully agree with him in his dictum that, "provided that a reasonable acceleration is provided over existing services, there is no justification for any transport company to increase its speed at what must invariably be a higher cost, unless the user is prepared to pay for it." That is sound doctrine, and no reasonable person can quarrel with it. When Qantas, for instance, started flying between Charleville and Cloncurry it would have been sheer extravagance to lay down 120 or 100 m.p.h. as a necessary minimum air speed or ground speed. The slowest aeroplane was so very much faster than any form of ground transport on that route that the obvious policy was to fly at the lowest economic speed, whatever that might be. But—and it is a big "but"—the term "existing services" took no count of rival air lines. Competition tends to force up speed, unless some compensating advantages, such as greater reliability or greater comfort, can be set against the higher speed. In some extreme cases the extravagance of the higher speed may ruin the more ambitious company, as seems not impossible in America, and then the slower, sounder concern will have things all its own way. That, however, is not the case on the London-Singapore route. The K.L.M. machines are safe and comfortable, and they cover the distance from Singapore to London in five and a half days against the eight and a half days of Imperial Airways. That fact must be faced. It would be foolish to ignore it. At the same time, speed is not the only consideration.

Night Flying

At the moment the comparison is not altogether fair, because Imperial Airways have a new fleet on order and a new and very fast schedule in prospect. The Short flying boats will not be quite so fast as the Douglas machines, to which the K.L.M. are probably committed for some years, but they ought to be even more comfortable. The main object of Imperial Airways will be deliveries in Australia, not merely in Malaya and the Dutch East Indies. Above all, the most effective way of increasing the journey speed of aircraft is to fly by

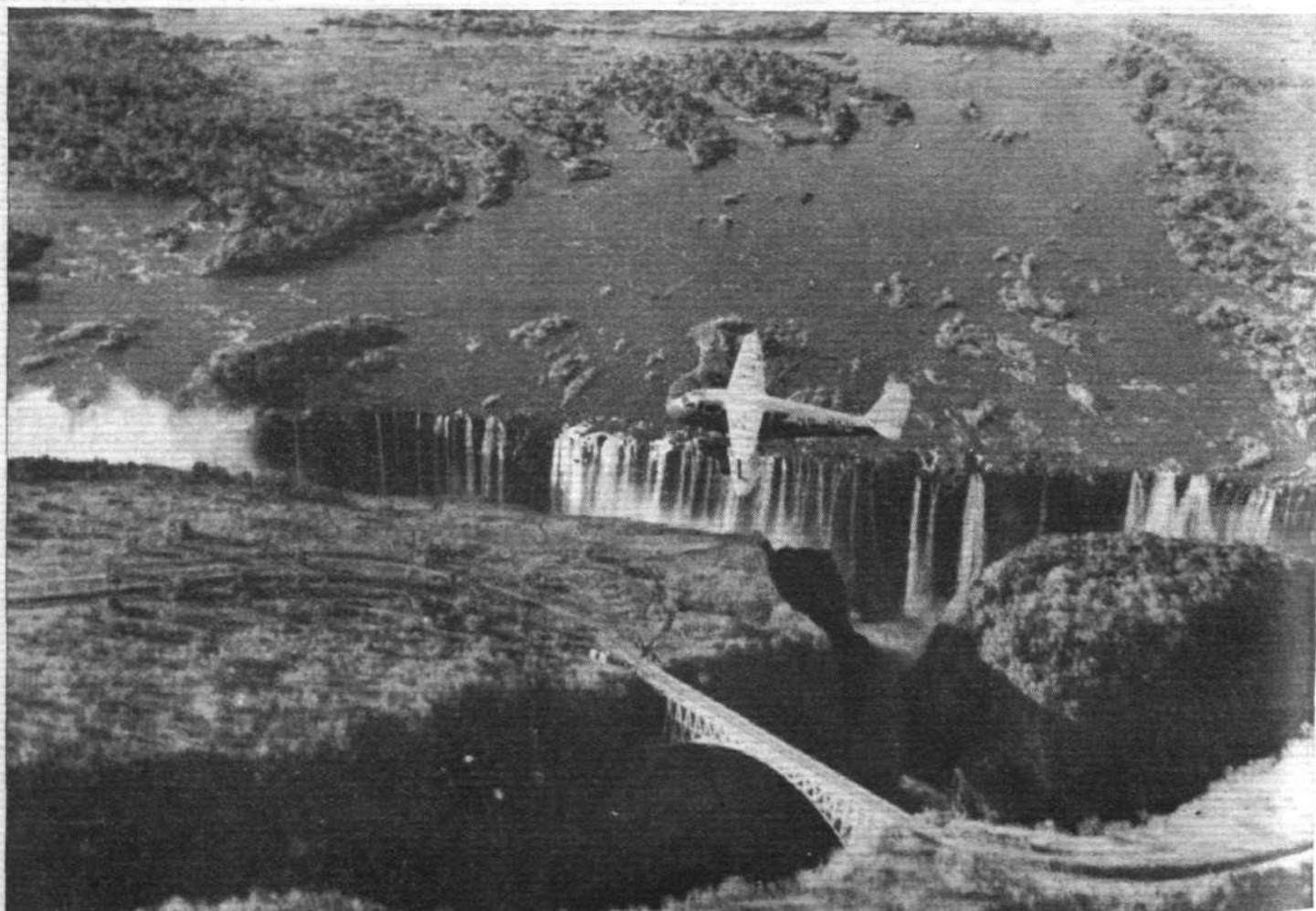
night as well as by day. Sir Eric Geddes made the interesting statement that to fly by night will be actually cheaper than to go in for very high speed but flying only by day. Therefore night flying will be adopted by Imperial Airways. The Short boats are being fitted out with sleeping bunks.

Exactly where the saving in expense will come through flying by night was not made clear in the speech. Greater speed in machines has to be provided by an operating company. Night lighting of aerodromes and routes is the responsibility of the local authorities. The question remains whether the saving will accrue only to the operators. Even if that is so, the various communities would hardly seem to have a grievance. Imperial Airways receive subsidies from the Home Government and from the Colonies and Dependencies over which they fly. If their working expenses are reduced by the action of those various Governments in lighting up routes, it is reasonable to suppose that the time will have been hastened when they will become independent of subsidies. The Colonies will also benefit, and in many cases benefit enormously, by the speeding up of the air services, and so their outlay will be justified on two grounds.

Before leaving the question of journey speed it should be remarked that, while Imperial Airways are about to embark on new schedules of unparalleled speed, the K.L.M. are not likely to remain quiescent. British designers likewise are sure to be preparing still faster craft before the Short boats have made a claim on the obsolescence fund.

A welcome, but none the less startling, fact was disclosed in Sir Eric's speech, namely, that Imperial Airways are no longer to have a monopoly of subsidies in Europe. The initiative in the matter came from the Government, which expressed a desire to be free from that obligation in respect of Continental air services north of a line drawn between London and Berlin. That points to the Scandinavian countries and the Baltic, and seems to indicate a desire by the Air Ministry to help some other company to operate in Northern Europe. The general opinion for long past has been that Britain ought to have had a finger in that pie for geographical and ethnological reasons. During the war our flying boats swept the North Sea, and it does not seem right that Britons who want to fly to Denmark, Sweden, and Norway should only be able to do so in foreign aircraft. When serious plans are in hand for flying the Atlantic it would not be logical to rate the North Sea as too tough a proposition, and a direct service from Great Britain to Denmark and Scandinavia would be much shorter than the present coastwise route. The tedious sea trip attracts plenty of tourists to the fjords, and the speedy seaplane journey would soon become equally popular. It is an attractive proposition. It is also a good thing that some company other than Imperial Airways should be able to receive a subsidy on a route which certainly cannot be called Imperial.

As for the new types ordered by Imperial Airways, comment was made on them last week. A description of the Short-Mayo composite aircraft will be found on p. 476 of this issue.



ABOVE A WONDER OF THE WORLD : A D.H.89 Rapide, which has recently been added to the Rhodesia and Nyasaland Airways' fleet, flying over the Victoria Falls and the Zambesi Bridge.

The Outlook

A Running Commentary on Air Topics

Cube Law Defeated?

THE A.R.C. (Aeronautical Research Committee) is not usually given to exaggeration; in fact, its utterances mostly err on the cautious side. When, therefore, in the annual report for 1934-35, it states, in connection with the possibility of building a 200-ton flying boat, that "No fundamental difficulties of construction are apparent as regards either water or air operation," one may take it that the statement is not lightly made; nor is the usual "provided" absent. In this connection it reads: "Provided that the number of engine units is not more than six or eight." The difficulties of transmitting something like 5,000 h.p. on a single shaft are admitted, but it is certainly cheering to learn, from so august a body as the A.R.C., that whereas a few years ago a limit in aircraft size appeared to be in sight, owing to the "cube law" factor, loaded weights of nearly half a million pounds are now discussed in all seriousness.

Apparently it is not the difficulty of designing suitable shafts for the high powers, but the effect of a number of airscrews along the leading edge of a wing which is to be investigated first. There does not seem to be any reason to doubt that it will be generally similar in principle to that made use of by two Englishmen in America, Bolas and Goodman Crouch, in a rather weird machine in which the airscrews are very large and, in fact, extend over almost the entire span. The whole thing seems rather like sitting in a basket and lifting oneself by the handle, but apparently it works.

"Missing" Pilots

AT regular intervals, since the time when aeroplanes were first used by private owners for serious transport, lifeboats have been put out and steamers have gone off their courses in order to search for pilots who have, in fact, never left the land.

Last week, for instance, a pilot left Egremont, Cumberland, with the apparent intention of flying across to Ireland, and, quite naturally, when he was overdue, lifeboats were sent out. In actual fact he had flown a few miles to Carlisle and, reports would suggest, had not taken the trouble to notify anybody.

This sort of thing not only gives pilots a very bad name, but might also lead eventually to a state when no notice whatever is taken, and the unfortunate pilot who really has descended into the sea will be left to swim by himself. The old "wolf" story will be repeated.

Fourteen-pounders

IN the early days of flying, before the war, there were two opposed opinions about teaching to fly, one holding that it was best to let the pupil go off solo, first doing straight hops, then longer hops, and finally turns; the other maintained that the logical way was to start with dual instruction before sending the pupil out alone. It was argued that in the feathered world the parents teach the young during their first faltering steps by watching, not by "dual." A crash occurred to a "solo" school machine away from the aerodrome, and the head of one of the other schools calmly remarked that probably "the mother bird wasn't there." Nowadays, the mother bird is always there

in the machine with the pupil until he is fit to go solo, and the main question is whether side-by-side or tandem seating is preferable in a school machine.

Experience is beginning to accumulate at schools where the De Havilland Hornet is being used, and on the whole it seems to be in favour of side-by-side seating. The Blackburn B.2 Trainer has been used for years, and is still being used successfully for training. And now the little Aeronca 38 h.p. monoplane is to be added to the list. The National League of Airmen, in conjunction with Light Aircraft, Ltd., will train pupils up to the "A" licence standard for the surprisingly low cost of £14.

By using a cheap aeroplane fitted with an engine of low power this low cost is probably quite practicable, as it will correspond to approximately £1 per hour. That a large increase in the number of "A" licences will result is not to be doubted. This is all to the good, as it will help to "spread the gospel." That a number of pupils will buy their machines afterwards also seems likely, and in time some of these will exchange their original type for a rather more ambitious one. The question then arises whether the Aeronca is sufficiently like any other light aeroplane in its handling characteristics not to make the change-over too difficult. Pilots who have flown it appear to think that after a few practice landings the Aeronca pilot will have no difficulty in handling any other light aeroplane.

Contracting to Expand

THE recently published list of orders for Service aircraft under the expansion programme contains little cause for excitement over the nature of the machines concerned. It does, however, reveal the extensive "farming-out" of orders which has been necessitated. Owing to the fact that the aircraft are required urgently, the majority of them are types which already are standard equipment in the R.A.F. In certain cases they have been improved and re-engined, and appear under a new name.

Four types of fighter are on order, from Glosters (Gauntlet and Gladiator), Boulton Paul (Demon), and General Aircraft (Fury). The Gladiator is the only type not already in service; the Hawker types are having Kestrels of the new series giving an increased performance.

For Army co-operation there are Hectors—modified Audaxes with Dagger engines (A.V. Roe)—and additional Audaxes have been ordered from Avros and Bristols.

Hind and Wallace light bombers are being built by Hawkers and Westlands respectively. The medium bomber class is represented by the Bristol 142, to be made by Bristols, and the new Vickers monoplane, now known as the Wellesley, ordered from Vickers. The only "heavies" are Hendons and Heyfords from Faireys and Handley Pages.

Avros, of course, are to build a large number of Anson general reconnaissance monoplanes.

Londons, Singapore III's, and Stranraers (general-purpose and coastal reconnaissance flying boats) have been the subjects of contracts awarded to Saunders-Roe, Shorts, and Supermarines.

For training there are Tutors (A.V. Roe) and Hart Trainers from Armstrong-Whitworth and Vickers.

These orders may be regarded, of course, as preliminary measures. It may be safely assumed that contracts have been placed for types of much more recent design straight "off the drawings."

COMPOSITE AIRCRAFT

THE reference made by Sir Eric Geddes last week (see page 487) to the Mayo "composite aircraft" now under construction by Short Brothers, of Rochester, has once more called attention to an interesting experiment which, it is hoped, will be begun some time in the spring of next year, and which is of a character so revolutionary that it deserves a somewhat closer examination. The experiment consists of the use of two aircraft rigidly joined together during the take-off and the climb to the operational height desired. When that has been reached the two are separated, the carried aircraft setting off on its journey and the carrier aircraft returning to the base.

Although (as *Flight* pointed out some months ago) something of the kind was tried during the War, the scheme appears fantastic at first sight. One's reaction is to dismiss it as another of those wild suggestions made from time to time by inventors who do not fully understand the fundamental principles upon which their inventions are based. Yet, as *Flight* remarked about a year ago, when the scheme first "leaked out," the fact that the inventor is one whose name is well known in British aviation circles compels one to delve below the surface and to examine the subject more thoroughly. When, moreover, a company like Imperial Airways has taken up the invention, backed by the Air Ministry, and when a firm of the standing of Short Brothers is willing to associate itself with the scheme and to undertake the construction of two aircraft in order that a thorough test may be made, it becomes doubly necessary to pay more than passing attention.

The Fundamental Principles

Data on the Mayo "composite aircraft" are not yet available, but it so happens that the fundamental principles involved are quite obvious, and anyone familiar with the subject of aircraft design and performance calculations can estimate, approximately at any rate, the primary factors and advantages which enter into the problem.

Basically, the *raison d'être* of the composite aircraft is the getting into the air of a very heavily loaded aircraft with the assistance of another, and lightly loaded aircraft. The heavy power loading of the former is reduced by the low power loading of the latter, and similarly, the wing loading of the combined aircraft is comparatively low, although that of the carried component is high.

As it may not be quite obvious why a very heavily loaded aircraft should be at an advantage, a brief outline of the problems involved may suitably be given before the more technical aspects are examined. This is not intended to be a treatise on performance calculations, but for the benefit of those who are not familiar with work of this kind it is necessary to go back to fundamental principles. The forces on an aeroplane are usually, for purposes of performance calcu-

Fresh Interest Focused on the Remarkable Short-Mayo Scheme by Sir Eric Geddes : Some Practical Aspects of the "Mother Aircraft" Idea Discussed.

By C. M. POULSEN

lations, split up into two: Lift and drag or resistance. These can either be calculated from known figures of existing aeroplanes or they can be obtained from wind-tunnel results on scale models.

At a given air speed the lift is proportional to the wing loading, that is to say the weight per square foot of wing area. A machine loaded to twenty pounds per square foot of its wing area must travel faster to remain in steady horizontal flight than one loaded to ten pounds per square foot. The price which has to be paid for the lift of an aeroplane wing is the airscrew thrust required

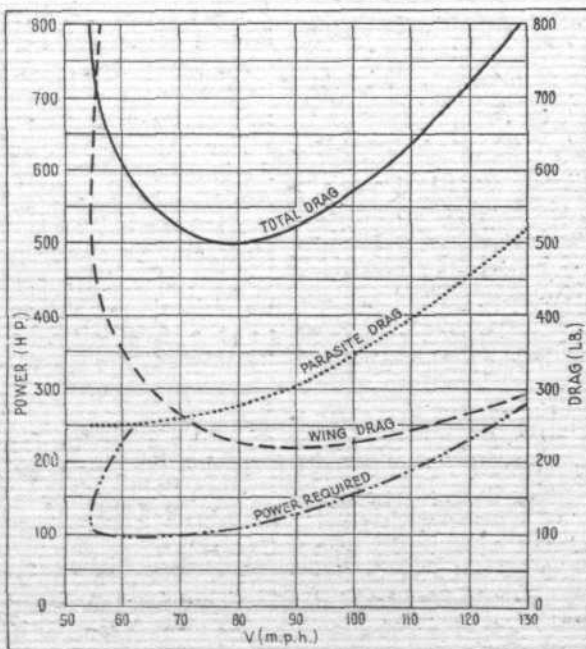
to overcome the so-called drag, or air resistance to forward motion. That drag, or resistance, arises partly from the wings and partly from the rest of the aeroplane. The drag of the latter is often referred to as "parasite drag," because it is resistance of parts which do not contribute to the lift, and therefore do no useful work. Obviously, it is possible to construct curves which show the drag, or resistance, at any forward speed of an aeroplane if the resistance of the various component parts is known, and bearing in mind that drag increases as the square of the speed. A typical set of such curves is shown in the illustration on this page. It will be seen that there are two curves which represent wing drag and parasite drag respectively, and a third curve of total drag, which represents the sum of wing drag and parasite drag.

Calculating "Horse-power Required"

The fourth curve on the figure represents "horse-power required." This is calculated from the total drag curve by the simple relationship which exists between force and power (power being defined as "the rate of doing work"). One horse-power is 550 pound feet per second, or 33,000 pound feet per minute, or 375 pound miles per hour. It is, of course, immaterial which of these units are used, so long as they are consistent.

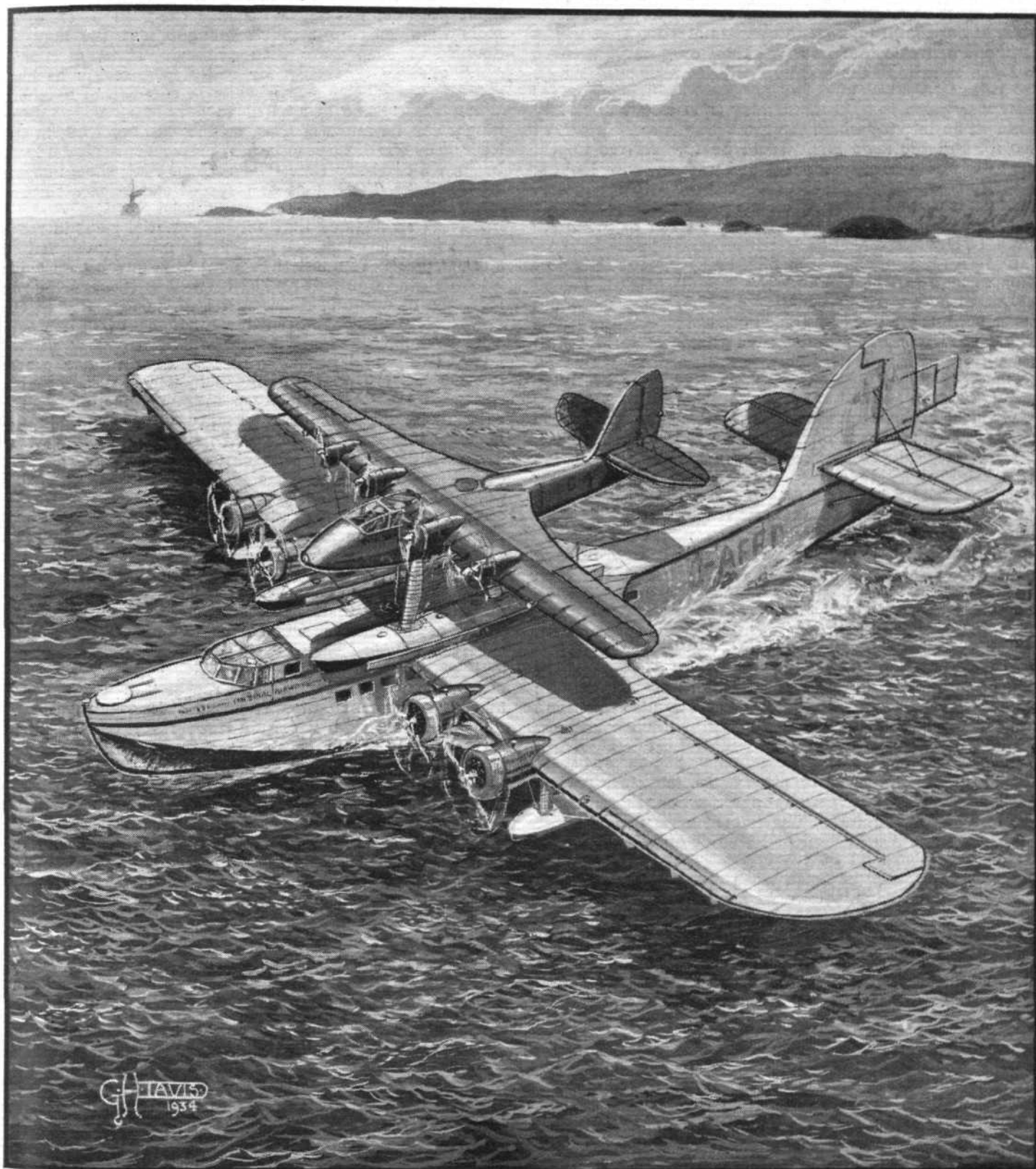
In the figure it will be seen that, for the particular aeroplane to which the curves refer, the total resistance at 80 m.p.h. is 500 lb. or $80 \times 500 = 40,000$ pound-miles per hour. As one h.p. is 375 pound-miles per hour, 40,000 pound-miles per hour obviously is equal to 40,000 divided by 375, or 106 horse-power.

Having seen how the "horse-power-required" curve is constructed, it becomes possible to examine the fundamental reason for the Mayo composite aircraft. The horse-power required curve, it will be seen, reaches a minimum value of just under 100 b.h.p. at a speed of about 65 m.p.h. For the particular machine in question, this would be the most economical cruising speed, i.e., the speed at which the smallest amount of petrol was consumed by the engine in keeping the aeroplane in the air, and if the object was to beat the world's endurance record, the machine would be flown at about that speed; not quite, because as the machine was lightened by the consumption of fuel, the most economical speed would change.



Typical drag and "horse-power required" curves of a biplane of average efficiency.

"MOTHER and BABY"



Courtesy of "Illustrated London News."

This drawing by G. H. Davis gives some idea of the manner in which the upper twin-float seaplane will be carried on the wing of the large flying boat in the Mayo scheme. The two machines take off locked together, virtually forming an eight-engined biplane. When the operational height has been reached, the securing catches are released, the upper unit proceeds on its way and the lower returns to its base.

Unfortunately, the object of a "practical" aeroplane is not merely to remain in the air as long as possible, but to "get somewhere." Hence an aeroplane is never flown at the point of the curve corresponding to minimum power required, but at a point much closer to the maximum speed end of the curve. This means that it is using up

much more power, and hence much more petrol than the minimum required merely to stay in the air.

In the Mayo composite aircraft the object, as already mentioned, is to get a very heavily loaded aeroplane into the air. From the curves it might be inferred that this merely means that one part of the total drag, that of the

wings, is reduced because of the reduction in wing area to give a higher wing loading. Superficially this is so, but other factors enter into the problem. The lift of the wings must obviously be equal to the weight of the aeroplane if horizontal flight is to be maintained. That means that one can calculate from the total drag curve a curve of L/D , or ratio of lift to drag, at the various speeds. If, for instance, the weight of the machine to which our curves refer was 5,000 lb., the maximum L/D would obviously occur at 80 m.p.h., where the total drag is a minimum at 500 lb. and the ratio L/D would be 10. At 120 m.p.h. the ratio would be only about 7, and with the wing loading used, it is wasteful in fuel to fly fast with this machine, because it means flying at an angle of incidence of the wings at which the ratio L/D is very inferior to the maximum L/D .

If we assume, for the sake of simplicity, that it is possible to load up the machine to twice its original loaded weight without altering its external shape, the result would be to shift the curves to the right, because the machine would need to fly faster at a given angle of incidence in order to remain in level flight. In other words, it would be made to fly at an angle corresponding more nearly to the maximum L/D , and would, therefore, be more economical at high speed. It is this fundamental reason which is at the bottom of the Mayo scheme. In his case, one may regard the increase in wing loading as having been attained by reducing the wing area, so that wing drag is reduced, while total drag is also reduced by enabling the machine to fly at an angle corresponding to a better value of L/D .

All this is very elementary and not strictly true, because other variables enter into the question, but it has been thought better to be slightly inaccurate in order to keep the mental picture clear.

High Wing-loading

In a normal aeroplane a limit is set upon wing loading by considerations of landing and take-off speeds. An excessively high wing loading means a dangerously high landing speed and a difficult take-off. When conditions are quite perfect such high speeds may be tolerated, but not when it comes to an aircraft which has to "earn its bread and butter." The seaplanes in the Schneider Trophy Race were loaded to more than forty pounds for every square foot of wing area. That meant a very small wing, but it also meant a take-off and landing speed somewhere in the neighbourhood of 100 m.p.h., and the Schneider machines could only be flown when water conditions were almost perfect. This fact would have ruled out the commercial use of the Schneider machines, even if they had had any pay-load, which, of course, they had not.

Apart from the direct advantages of a high wing loading, as outlined above, which may be regarded as primary factors in the scheme, a number of secondary advantages follow, the cumulative effects of which add further, and very greatly, to the efficiency. A very high wing loading gives a reduction in wing weight, and this in turn reduces the weights of other components. If the high-speed aircraft is a seaplane, the resulting weight-saving, plus the fact that the machine can be designed for the landing weight at the end of its journey instead of for the much greater weight at the beginning of the flight, has the very important effect that the floats can be of approximately half the size that would otherwise be necessary. This further reduces weight and drag, and so the power necessary for a given speed, or in other words the weight of fuel that has to be carried. The reaction of all such items on the others results in an overall improvement in

efficiency which makes possible very long flights at high speed while still leaving something in hand for pay-load. It is difficult to assess accurately the percentage improvement possible, but for a machine designed to cruise at more than 200 m.p.h. it is thought that the range is doubled or even more than doubled. It is, of course, quite obvious that only for really long ranges at high speed is the scheme worth while in commercial aviation. When the scheme is applied to a military aircraft, the ranges can be much shorter, as the military load, in the form of bombs or torpedoes, can, unlike a commercial load, be got rid of at any time. This means that, should engine failure occur, the bombs or torpedoes can be treated very much like the fuel of the commercial version.

Having ascertained that very substantial gains in range with a given pay-load are possible by using heavily loaded aircraft, the next question is how to get such a machine into the air. Catapulting has been done successfully; in fact, the catapulting of aircraft is done regularly in the Navy. It might have been thought that a catapult would offer a simpler and cheaper solution. Up to a certain point, this would probably be so. For instance, where but a relatively modest increase in wing loading, and a correspondingly small increase in range, is desired, the catapult might well be a cheaper way of getting the machine into the air. It would have the advantage that it is a well-tried method which introduces no undue element of risk. If, however, extreme ranges with a reasonable pay-load are aimed at, the composite solution scores on certain points, assuming always that the actual launch of one machine from another is feasible.

The Altitude Question

It is well known that by flying high a gain in speed is obtained, owing to the smaller density of the air, if the power of the machine can be maintained. Progress with superchargers has been considerable during recent years, and nearly every engine manufacturer produces one or more supercharged types. The use of "blown" engines in the business half of a composite aircraft brings with it two advantages, which in turn react on the other features of the machine and tend to make it even more efficient for long-range, high-speed work. A gain in speed follows from flying high, and the fact that the machine is assisted to its operational height makes it possible to do without variable-pitch airscrews. These are, of course, a great deal heavier than fixed-pitch propellers, and thus a gain in weight is effected by using the latter, without the gain being largely counterbalanced by a loss in airscrew efficiency, and the airscrews can be designed for the cruising speed conditions with no fear of it being stalled at the take-off, as would probably be the case with an orthodox aircraft designed to cruise at very high speed.

It will be realised that in this connection the composite aircraft scores over the catapult. The long-range machine is helped up to its operational height by the "mother" aircraft, whereas with a catapult it would merely be assisted up to a certain flying speed, likely to be considerably below the cruising speed, and thus the airscrew, if of the fixed-pitch type, would be working at low efficiency. Furthermore, the consequences of engine failure shortly after take-off would be likely to be serious. With the composite aircraft the altitude attained before separation is such that there would be time to jettison all the fuel before the machine had to alight, even if all the engines cut out simultaneously.

Some of the problems connected with the take-off and the separation of the two machines will be dealt with in a subsequent article.

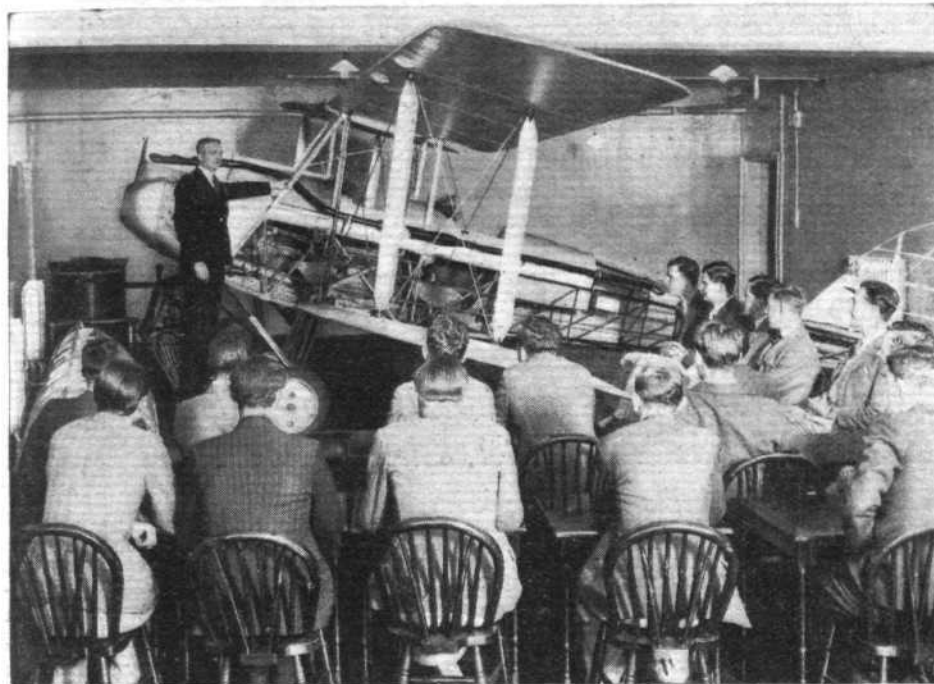
"AERIAL WONDERS OF OUR TIME"

MR. HAMILTON FYFE, "Boyd Cable" (Lt. Col. E. A. Ewart), Major Oliver Stewart, M.C., A.F.C., and Capt. J. B. Sterndale Bennett, M.C., are the principal writers in the first weekly part of a new publication entitled "War in the Air—Aerial Wonders of our Time," which is edited by Sir

John Hamilton and is published by the Amalgamated Press, Ltd., at sevenpence. The names of these writers are sufficient guarantee of good and authoritative reading matter, while the profuse illustrations make the issue very attractive. This publication is sure to be popular with a wide public.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



FIRST PRINCIPLES : There are twenty-five members—to be increased, it is hoped, to seventy-five—of the newly formed London University Air Squadron, which has its headquarters in Exhibition Road, South Kensington. A rigging lesson is here seen in progress. The inaugural meeting is reported on page 492.

Departure from Alliteration

It has been decided to give the name Wellesley to the recently adopted Vickers monoplane which now, incidentally, is classed as a medium bomber. Pegasus 'X' engines of 820 h.p. are likely to be fitted to the production machines.

The "299" Crashes

The large four-engined Boeing 299 bomber (built to compete with two other types) crashed at Dayton, Ohio, on October 30 while taking off on a test flight and was destroyed by fire. One of its five occupants was killed, but the others escaped with serious injuries.

Going Down Under

C. J. Melrose and H. F. Broadbent left Croydon last Saturday, each in a Percival Gull, on a homeward flight to Australia. Melrose is using his King's Cup mount and Broadbent is delivering the other Gull to a customer. Melrose took off from Nicosia on Monday afternoon for Baghdad.

Empire Air Defence

The Duke of Sutherland (President of the Air League of the British Empire) will preside at a meeting of the British Empire League at the British Empire Club, 12, St. James's Square, London, S.W.1, on Thursday, November 14, at 5 p.m., when Air-Comdre. J. A. Chamier will deliver an address on "The Air Defence of the Empire." Invitations may be obtained from the British Empire League at 49, Queen Victoria Street, London, E.C.4.

The Legatee

The pilot of an air liner carrying six passengers died over Moscow. His machine went into a spin, but one of the passengers, an ex-pilot, managed to get it under control and make a landing.

Out of the Past

It is believed that the wreckage of an old aeroplane which has been found by trappers in a New Brunswick forest is that of the machine of Nungesser and Coli, which disappeared during an Atlantic flight attempt in 1927.

Strife at Woodford Green

A fortnight after being unveiled at Woodford Green, Essex, an anti-bombing monument erected "to those who, at the League of Nations in 1932, upheld the divine right to use bombing planes" has been smashed and part of it stolen. A more substantial edifice is to be set up.

Capt. Percival Honoured

The Johnston Memorial Trophy, founded in memory of the late Sqn.-Ldr. E. L. Johnston, who died in the R.101 disaster, has been awarded by the G.A.P.A.N. to Capt. E. W. Percival for his London-North Africa-London flight on June 18 last in a standard Gull. It may be recalled that Capt. Percival averaged 160 m.p.h. from Gravesend to Oran, and 156 m.p.h. on the homeward journey.

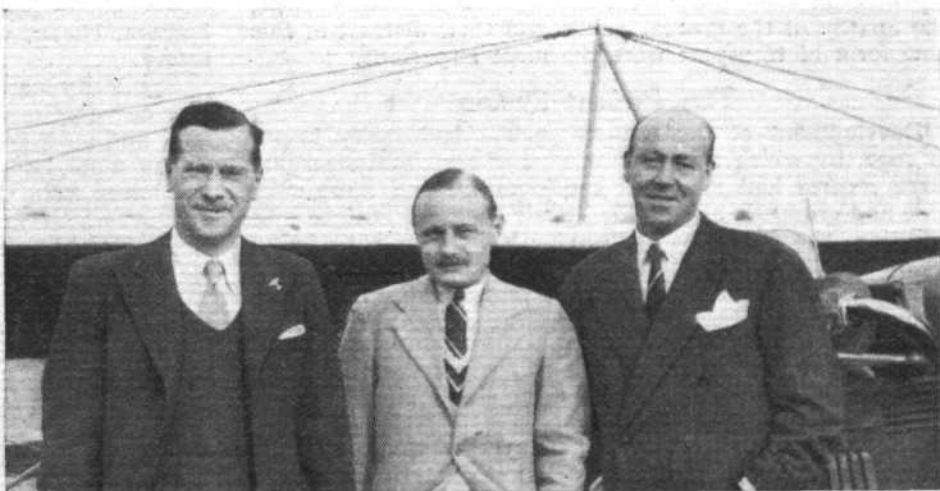
Amazonian Exploration

A D.H. Moth Major and a Fox Moth, on floats, are going on an Amazon expedition, for which the Spanish Ministry of Education is providing about £500,000. The expedition will explore some of the more remote waters of the Amazon with a flat-bottomed boat as its base. A hangar will be provided on deck for the machines, which are to be used for advance reconnaissance, photography, and map-making.

Twenty-five Years Ago

(From "Flight" of November 5, 1910)

"On the Sigma stand a two-cylinder rotary is shown, developing 35 h.p. at 1,140 revs. From the cylinder heads spring the propeller blades, thus combining in one both engine and propeller. The cylinders are of cast iron, and are fixed to an aluminium crank case. The valves are rotary, driven by a rotating shaft from a bevel-gearing on the crankshaft."



PERSONALITIES at the new Aeronca School, which, as described on page 492, offers flying instruction, enabling the pupil to secure his "A" licence, for £14. Left to right: Capt. Norman Macmillan, of the National League of Airmen; Mr. J. H. Hill (instructor); and Mr. B. Brady of Light Aircraft Ltd. (Flight photograph.)

The Airspeed Envoy, as used by Portsmouth, Southsea and Isle of Wight Aviation, Ltd. ("Flight" photograph.)



AIR TRANSPORT PROBLEMS

Points from the Inaugural Brancker Memorial Lecture : Some Interesting Figures and Comparisons : Lt. Col. Shelmerdine Faces the Facts

IN his lecture delivered to the Institute of Transport on October 30, Lt. Col. F. C. Shelmerdine, the Director-General of Civil Aviation, discussed many of the problems and needs of air transport in this country.

Without being unnecessarily gloomy he gave the facts as they are, and suggested ways and means of combating the difficulties which surround the new method of transport when competing with—or, at least, running parallel to—existing transport systems. It was a fitting subject for the first of a series of lectures designed to perpetuate the memory of Sir Sefton Brancker, who did so much for civil aviation. Sir Cyril Hurcomb, the President of the Institute of Transport, was in the chair.

After summarising the history of internal air transport—from the Hendon-Windsor mail service in 1911, Daimler Airways' service between Manchester and London in 1922-3, Northern Air Lines' experimental services in 1924-5, and Imperial Airways' experimental service between London, Birmingham, Manchester and Liverpool—Col. Shelmerdine discussed the present-day problems.

Several factors, he said, contributed to the failure until recent years of all attempts to establish internal air services on a firm basis, of which the scarcity of aerodromes (despite the efforts of the Air Ministry to interest municipalities in their provision), the lack of suitable aircraft, the apathy of the general public and their distrust of this new form of transport were the most important.

The Present System

Development of the present system had really begun in 1932, by which time the number of aerodromes serving large centres had increased considerably, and more suitable and economic aircraft had made their appearance. In addition, the public had grown more familiar with flying as the result of the activities of various air displays.

By the summer of 1934 about twenty-five services were in operation. In that year the railway companies formed, in conjunction with Imperial Airways, Railway Air Services, and the Postmaster-General took steps to utilise the internal services for the carriage of mails. Highland Airways carried the first internal air mail under contract on a service between Inverness and the Orkney Islands. Later in the year the Postmaster-General made the important announcement that in future the Post Office would be prepared to use for the conveyance of first-class mail, without extra charge to the public, any regular internal service which could give an acceleration in delivery.

On the face of it, said Col. Shelmerdine, satisfactory progress appeared to have been made, but this was not a true picture, for with very few exceptions indeed, the internal air lines were losing money. In many cases the selection of unsuitable routes might have been primarily responsible for failure. Apart from certain routes it was difficult to say what considerations had governed the selection of these, unless it had been assumed that the existence of an aerodrome meant the existence of demand. Operators had no known data on which to base their estimates, but we had to look further to find the reasons for the failure of air transport companies to pay their way. To reach any conclusion it was necessary to consider what air transport had to offer to the travelling public and what were its essential requirements for safe and regular operation.

Cheap speed was the chief advantage of air travel, but this was valueless unless it saved time over any alternative means of transport. From a business man's point of view the time spent in travelling was unproductive time. If this unproductive time could be shortened it was worth money, but only a certain amount of money.

From the transport operator's point of view the cost of reducing the time of the journey was the cost of increasing the speed of travel. The cost went up until the point was reached when it was cheaper to take to the air. Speed, however cheap, was not enough. It must be obtained in safety.

Regularity was of financial importance. A cancelled service or a late arrival might involve passengers in financial loss, and such passengers were apt to be lost for ever.

The more hours that an aircraft flew during the year the lower were the overhead costs per mile flown. Frequency, which was a factor of speed, appealed to the public. The main things to be desired, therefore, were cheap, fast, regular and frequent services with safety.

The passenger fares on different air lines and for different routes varied between 3d. and 10d. per passenger mile. The average fare was about 4d. On the Imperial Airways' service to Paris the fare per passenger mile was 5½d., and the public were very willing to pay this. The fares to-day of our internal air lines could not therefore be regarded as exorbitant nor liable to act as a deterrent, provided any real advantage was offered.

The speed might be cheap enough, but was it fast enough? From the public's point of view the journey did not begin at the airport. The air journey might therefore be said to begin and end at the town centres and to com-

bine the fastest and about the slowest methods of transport now commonly in use. The result was unfortunate.

Col. Shelmerdine took, as an example, an air journey of 100 miles. The average distance of a provincial airport from the centre of the town which it serves was $3\frac{1}{2}$ miles. The average speed of a coach through a built-up area was 12 m.p.h. The journey would therefore take $17\frac{1}{2}$ minutes, or, to be on the safe side, 20.

At the airport it was usual to allow a period of five minutes for embarking and disembarking the passengers. The pure speed of the air liner was the speed at which it cruised. If a modest allowance was made for progress this might be assumed to be 160 m.p.h. On an air journey this pure speed was adulterated and became what was known as the "chock to chock" speed. Allowance had to be made for certain necessary manœuvres of the aircraft such as taxiing on the aerodrome, traffic delays, and so on. For a single flight along a busy air route it was reasonable to allow 15 minutes for such delays.

The air journey was therefore made up as follows:—

	Mins.
Road journeys to and from the airports at 20 minutes each	40
On- and off-loading the aircraft	10
Aircraft manœuvres—allow	15
100 miles at 160 m.p.h.	37
Total	1 hr. 42

The average speed between town centres was thus 58.8 m.p.h. On an air journey of 100 miles you achieved 37 minutes' fast flying and dawdled for 1 hr. 5 minutes. If the journey began or ended in London, the position was naturally worse as it took about 40 minutes instead of 20 to reach the airport.

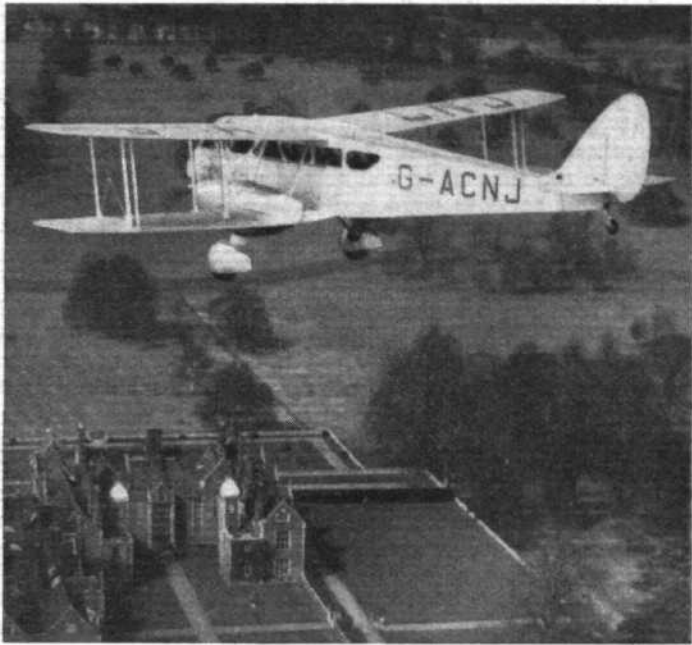
Distance Pays

It was obvious that by increasing the length of the trip more of the time was spent in the air travelling fast and a smaller proportion on the ground travelling slowly. This increased the average speed for the air journey by the following amounts if the same basis of calculation was used:—

200 mile journey	Average speed 86 m.p.h.
300 " "	" " 101 m.p.h.
400 " "	" " 112 m.p.h.

If these speeds were to mean anything they must be compared with the speeds of alternative methods of transport. Did the passenger save enough time to save money? This must depend upon the route followed, which, for the purpose of comparison, could be classified under one of three main headings: (1) the main trunk routes over land where surface communications were fast and frequent; (2) other land routes; (3) routes that cross water.

The fastest means of land transport in this country was the train. The "Jubilee Express" did the 268 miles between London and Newcastle at an average speed of 67 m.p.h. He had been told that a train called "The



A machine which has played a large part in unsubsidised air-line operation—the D.H.84, or Dragon, which is still in successful use all over the world. (Flight photograph.)

Zephyr," on the Chicago, Burlington and Quincy Railroad in the U.S.A., averaged 73 m.p.h. for 116 miles, and that the "Flying Hamburger" averaged about 76, and that the Germans hoped shortly to attain an average speed of 80 m.p.h. on some of their new schedules. A very serious effort was being made to increase the speed of rail travel, and this must affect air travel. Unless air lines could average a speed considerably in excess of 80 m.p.h. they would hardly attract the public on routes that parallel the main trunk railway routes. According to the calculations it was only on journeys of 200 miles and over that this speed could be maintained, and it might not be sufficient.

Col. Shelmerdine took as an example the journey from London to Liverpool, a distance of 180 miles. The fastest train of the day took 3 hours 35 minutes, which was an average of 50.4 m.p.h. The fastest air line did the journey in 2 hours 50 minutes, which gave an average of 63.7 m.p.h. The time saved was 45 minutes. There was a difference in the fares of 18s. 9d., and the cost of the time saved was therefore 5d. per minute, or at the rate of £30 a day.

On other land routes the speed of surface transport was less and the air line would appear to offer greater advantages.

The main trunk communications of this country followed fairly distinct lines, and because, presumably, they were wanted. Conversely it might be argued that if they were not somewhere else it was because the demand was lacking. For a great many years air lines between any two points in the United Kingdom would only carry a small percentage of the total traffic between those points. Along the main trunk routes there would probably be more people willing to buy a saving of time, but there would be only a small saving to offer. On other routes there might be a much greater saving of time to sell but too few people willing to buy it.

The fares would be considerably higher if small aircraft were used on infrequent services than if large aircraft were used on frequent services—percentage loads being equal. Between 14-seater and 6-seater aircraft the fare difference on certain journeys could be of the order of one-third.

On routes that crossed water the advantages of the air line were greater because the average speed of the surface journey was lower. It was clearly for this reason that, of the sixteen air lines which were operating at one time



The D.H.34, which, as mentioned by Lt. Col. Shelmerdine in his lecture, was used on an internal service operated by Daimler Airways between Manchester and London in 1922-3. (Flight photograph.)

in the United Kingdom, fourteen were partly over water.

It seemed, therefore, that along the main lines of communication overland, air lines could offer an appreciable saving of time on journeys of 300 miles and over. On other journeys that do not involve crossing water, air lines might offer a saving of time over shorter distances than 300 miles, but the public demand for this time-saving might be too limited to enable the air line to pay.

Frequent services were a desirable factor if there were adequate loads offering. At the present moment the aircraft on our internal services spent something like 90 per cent. of their time on the ground. It had been calculated that a 14-seater aircraft standing idle on the ground was costing its operator ten shillings an hour. An aircraft was well employed if it spent 1,500 hours a year in the air. It was doubtful if the aircraft on our internal lines averaged much more than 600 hours a year.

For a great many years regularity had been the enemy of safety. We could only fly in suitable conditions. It was clear that if air transportation was to amount to anything, these conditions would have to be changed, and they were being changed. There had been many difficulties to overcome, but he was confident that we should succeed to a point where from being the method of travel most sensitive to the weather the aeroplane would become the most independent.

Traffic Control

Regular services in bad weather would give rise to the further problem of traffic control. When pilots could no longer see to get out of each other's way, sooner or later there must inevitably be a collision, particularly near busy airports, unless flying were guided and controlled by an efficient method of "block signalling."

Wireless aids and traffic control should make it unnecessary for air lines to close down in the winter. They should also be able to operate equally by day and by night. This would help to increase the number of hours that aircraft could be flown in the year. It would have the further advantage that a considerable amount of mail would be able to go by air.

If surface travel was speeded up, then an overland air journey of less than 300 miles might be too slow to attract the public. Was the percentage of air travellers big enough to justify frequent services with large aircraft all the year round so that a profit could be made? He did not think that anyone would know until it had been tried. Nearly all our best airports were grouped within 200 miles of each other, whereas if we wanted to fly from London to Edinburgh or Glasgow, we found that Edinburgh had no civil aerodrome and Glasgow had an aerodrome that was not suitable for use in all weathers. Belfast, which was a long way from London as well as over water, was in the same position. It was encouraging, therefore, to realise that three of the most promising routes still remained to be operated in the conditions of frequency, regularity and continuity that appeared to be necessary to ensure financial success.

Co-operative Advantages

The choice of an air route, Col. Shelmerdine thought, should be regarded more from the aspect of the territories that it served than of the towns that it served. A territorial air terminus could be served by feeder air services wherever these were justified.

The main service to a terminal airport would always be by surface transport. It was here that air and surface transport would each derive the greatest benefit from co-operation. It was true, no doubt, that air transport would rob surface transport of some long distance traffic of a light and urgent kind. On the other hand, air transport would create a certain amount of traffic that never moved until long distance air travel saved the time that made the move worth while. From the terminal handling of that air-created traffic, surface transport would benefit just as no doubt it benefited from serving our principal maritime ports.

If in serving our airports, surface transport could reduce the delay in reaching them, it would indeed have contributed something of very great value to aviation.

Col. Shelmerdine concluded by hoping that nothing he had said had given the impression that he took a gloomy view of the future of our home air lines. But he did take a thoroughly gloomy view of the people who talked about air lines from every town to every other town in the country. Even if such lines were financially justifiable, he was afraid that they would be operationally impossible. It was out of a sincere desire to encourage aviation that often a great deal of rubbish was talked. To counteract that rubbish from time to time was to do aviation a service.

THE DISCUSSION

AFTER thanking Lt. Col. Shelmerdine for his very informative yet easily understood paper, Sir Cyril Hurcomb made him a presentation in honour of the event. Mr. Lawrence Wingfield, Clerk to the G.A.P.A.N., then presented Sir Cyril with a copy of the late Sir Sefton Brancker's biography, and Lord Gorell, the Chairman of the Royal Aero Club, congratulated Col. Shelmerdine on his impartial and strictly matter-of-fact paper.

Speaking of the importance of the load factor in transport, Sir Oswald Mance asked to be given an idea of the relation between machine size and paying possibilities. He also asked whether, with a 60 per cent. load factor and 5d. a passenger-mile, an air service could be made to pay.

Amalgamations, he said, were necessary and inevitable if only to reduce overhead costs. Operating costs were more nearly related to the actual costs in air transport inasmuch as new equipment must be bought much more often and be maintained much more carefully than in the case of road transport. What, he asked, were the characteristics of air transport as such?

Finally, he suggested that the first sign of airmindedness would be a great increase in the number of private machines, and that special aerodromes would be necessary for them.

Mr. Nigel Norman claimed that air journeys should be analysed on time and not on distance—in other words, presumably, the saving of time over other means of transport was the important point. He complained of the shortage of airports, and suggested that there was only one really fully equipped example in the country. Operators, therefore, had little chance.

On the other hand, he admitted, the airport owner was laying out a very great deal of money which might or might not be returned. An airline operator could give a service up, but an airport owner was unable to give up an airport when it was found to be a poor proposition.

The Need for Regularity

Stressing the need for absolute reliability and regularity, Mr. W. P. Bradbury, of Railway Air Services, explained that if, in the time-table, all possible wind conditions were allowed for, the advertisement of really high speed would be lost.

He explained that Sir Oswald's figures would make any operating company very happy indeed. As it was, the fares were as high as possible, and therefore the costs must come down.

Air Comdre. Fellowes, in a somewhat belligerent speech, said that he thought that the Post Office arrangements were inadequate, and that the Government ought to give contracts to certain selected operating companies. He suggested that 100 per cent. all-weather regularity, using fog-landing equipment, might be seriously tried with freight only in order to see whether it was possible. Evidently Air Comdre. Fellowes did not doubt that it would be possible to obtain pilots who would be prepared to take the inevitable risks.

He was violently opposed to monopolies in any form, and complained of the fact that the smaller operators could not use the general booking facilities.

Lt. Col. Shelmerdine, in his reply, agreed that little progress could be made until there were more airports, and that true zero visibility landings would be impossible until better airports were available. He said that there were so many points for and against the idea of a monopoly that the matter could not easily be settled in a moment.

The control of private flying would be an eventual necessity, and suggested that the use of receiving sets might then be insisted upon in the case of all private aircraft.

Private Flying



Topics of the Day

Harking Back

IT would be interesting to discover how the new generation of pilots would perform on the sort of aeroplanes that were flown before the last war. Whether, with their more complete knowledge of the whys and wherefores, they would put up a fair display, or whether, after one terrifying circuit, they would sensibly place the relics in retirement because the machines were dangerously lacking in control and stability.

During the past ten years quite a number of club-trained pilots have flown reconstructed or reconditioned war-time machines without coming to any serious harm. One pilot I know has owned both a Bristol Fighter—which required the help of four men and a boy during the starting process—and an S.E.5 with a 120 h.p. Airdisco engine; this was successfully forced-landed on at least one occasion and was eventually written off by another experienced club pilot.

The trouble with the "Brisfit" was that heavy landings usually strained so many things, since the stresses passed by devious routes up to the centre section. However, there are quite a few still lying about in hangars in various stages of disrepair, and one or two still being flown by enthusiastic people.

It is a good thing, perhaps, that there are no Camels or Pups left for adventurous pilots—though the Pup, one is always told, was a sweet little aeroplane. The Camel had a few bad habits.

Rebuilt Relics

BUT all these are comparatively modern types. I was thinking more of the genuinely early birds of the 1909-1914 era.

Some years ago a rebuilt Curtiss biplane of the "fresh air" type was flown in America and demonstrated at the National Air Races at Cleveland, and a Bleriot monoplane was flown here by a French pilot, M. Quatremarre, at an R.A.F. display. In fact, London Film Productions borrowed both this old-time Bleriot and a pilot while "The Conquest of the Air" was being filmed. This machine, however, though an excellent imitation, is not of the cross-Channel type, and is fitted with a usefully powerful, though genuinely antediluvian, six-cylinder radial Anzani. Even so, its performance was a trifle unnerving.

I believe that a Maurice Farman biplane was, until quite recently, flown about Australia by some enthusiastic person, and there, too, a Bleriot monoplane was built and actually used quite seriously by another humorist. In Germany I have seen one or two surprising affairs which were still in flying condition, though these are probably no more remarkable than our own few Bristol Fighters. One, an Albatross L.30, resided, until the spring of this year at any rate, in a hangar at Hannover Airport, and was aptly labelled *Onkel Robert*.

The Real Thing

NEXT year, all being well, we shall see in this country a cross-Channel Bleriot, which has been built, with endless patience and at not inconsiderable cost, to be correct to the tiniest detail.

Mr. R. O. Shuttleworth, the private owner and car-racing enthusiast, who has—quite apart from a few aeroplanes which are hired out—a fleet of beautifully finished "old crock" cars which motor surprisingly, has, with Mr. Jackson, searched the country for bits and pieces on which to base their work. Quite a number of the original parts, including the undercarriage and tail-wheel fittings, the queer bell-based control column (called the *cloche*) and tank, have been cleaned up, rebuilt and used again.

Most of these parts were obtained from Mr. Grimmer, of Ampthill, Bedfordshire, who made several flights with a Bleriot (actually Number 14, I believe) in the early days, and whose machine was still to be found, in a far from airworthy condition, at Ampthill. An original three-cylinder Anzani was found in the shop window of a small garage. Care and the use of a few modified parts will enable the machine to be flown with this engine of doubtful power output.

The Reward of Patience

RECENTLY I saw the completed airframe of this remarkable machine in the workshops of the Warden Aviation Company, near Biggleswade. Certainly Mr. Jackson, with an assistant from the estate, must have put in an amazing amount of patient effort, particularly since he had no drawings from which to work and since the original woodwork had simply warped out of recognition during the last twenty-five years.

There was never any question of modernisation, save where certain small features were considered to be definitely weak. Ash has been used for the frame, as before, and the fuselage bracing has been carried out with fixed-length piano wires—a job which, by itself, would have taxed the patience of Job himself. In fact, Mr. Jackson had to build one side with turnbuckles before replacing these with the original type of bracing.

Needless to say, the genuine wing warping lateral control will be retained, and turns will presumably be made very largely on the rudder—which appears inadequate according to present-day standards. Nevertheless, the small rudder surface ought to be a distinct safeguard when the machine is being flown for the first time.

An examination of this new-old monoplane suggests, depressingly enough, that we have not travelled so very far since 1909. The Bleriot had a sprung tail wheel and castoring undercarriage wheels, which will probably make Mr. Shuttleworth's first take-off a most emotioning procedure!

INDICATOR.

Private Flying**FROM the CLUBS***Events and Activity at the Clubs and Schools***CARDIFF**

The flying time for the month of October totalled 34 hr. Mr. M. J. Turnbull has joined the club. There are now two Moths in use and one is still undergoing its C. of A. Mr. Norman Edgar came over in a B.A. Eagle on November 4, for demonstration purposes.

R.A.F.

The first annual ball of the Royal Air Force Flying Club was held at the Grosvenor House last Friday night and the evening was a great success.

Wing, Cdr. G. R. A. Deacon and F/O. A. D. Grace have recently joined the club.

SOUTH STAFFS

Heavy rain and high wind prevented much flying last week, but Mr. S. B. Yardley, a director of the Eagle Gliding Club, made a successful first solo on a power machine, and Mr. H. E. Griffiths did his tests for the "A" licence.

Mr. D. Davies has joined as a flying member.

READING

Prevailing gales and very heavy rain have handicapped flying during the past week and the total was only 16 hr. 25 min.

Mr. Gill has been doing night flying prior to taking his "B" licence and General Lewin has taken delivery of his new de Luxe Hawk Major and is on his way back to Kenya. He writes to say that in spite of heavy gales and storms the machine was behaving well. F/O. L. E. Dalrymple joined the school.

The first dance of the season has been postponed until November 30.

HANWORTH

Flying last week was seriously handicapped through adverse weather conditions which prevailed in the form of heavy winds, amounting to gale force, and morning fogs. One first solo was made by Mr. F. Reekie.

Arrangements have been made for the National League of Airmen scheme to start at Hanworth on Monday, November 4. It is anticipated that a great number of N.L.A. members will qualify for their licences under this scheme. Owing to the reduced subscription of the Hanworth Country Club, the membership has increased considerably and numerous dances and other events have been arranged for the coming season.

CINQUE PORTS

Mr. A. J. S. Morris has been appointed to the instructional staff at Lympne. He fills the vacancy created by Mr. Ken Waller, who went to Brooklands earlier in the year. Mr. K. K. Brown remains as chief instructor with an assistant in Mr. L. H. T. Cliff. Mr. Morris, who learnt to fly at Lympne in 1930, is a member of the R.A.F. Reserve, and has many hundreds of hours' flying to his credit. On Monday of last week he flew Mr. Van Marken's Tiger Moth to St. Engelvert.

Several members are taking courses of blind flying. M. Provost and M. Dupont visited the club on Saturday from Ostend and remained to lunch. Bad weather kept flying down to the low figure of 33 hr.

YORKSHIRE

Stormy weather reduced flying time to 8 hr. 20 min. last week, but a total of 70 hr. 20 min. was reached during October, despite bad conditions. Aviation Group members continue to put in a goodly number of flying hours, and of the forty-six members of the Group, twenty-five are under instruction and four have already obtained "A" licences.

The club is shortly to have another machine when a new Hornet Moth will be purchased. One of the club's present Moths is being fitted up to enable blind flying instruction to be given at Yeadon. This machine should be ready within the next week or so.

The annual general meetings of the Yorkshire Aeroplane Club and Yorkshire Airways (its associated concern) will be held at the Clubhouse on Thursday, November 21.

HESTON

The gales put a stop to school flying during a few days last week. At such times there is a rush of pupils to Capt. G. W. Ferguson, who instils navigational doctrine in a sort of dentist's chair; and to Vaisey, who explains with detail and relish the 1,001 things that *could* go wrong with a badly maintained aeroplane. . . . "You look for dry rot in the upper half and wet rot in the lower half . . ." and so on. It is all very depressing and destructive to one's rooted belief in the infallibility of modern aircraft. But the silly, small mishaps which occur when private aeroplane owners are away from home show how very few flying schools include these things in their curriculum.

The two "A" licences applied for last week in the names of Mr. P. S. Q. Andersen and Mr. J. G. T. Tatham brought the October output of licenced pilots to nine.

LONDON

Gales which prevailed last week curtailed flying at Hatfield, and the London Club was able to put in only 28 hr. 25 min.

LEICESTERSHIRE

Dr. L. G. Anderson has gone solo. A successful dance was held in the clubhouse on October 11. Flying time for October totalled 60 hr.

REDHILL

There are four new pupils in the wireless school, three are taking blind flying instruction, and eight new members have joined the Redhill Flying Club. On November 1 Mr. F. R. Long made his "B" licence night flight.

LIVERPOOL

October was a month of changeable weather, and on a number of days instruction was impossible. However, the total flying time for the month shows a considerable increase over that for the corresponding period last year, 183 hr. 55 min. being flown. Last week 28 hr. 15 min. flying was recorded.

C.A.S.C.

Ten members attended at Fen Ditton aerodrome last Sunday, and although the wind was high, 1 hr. 5 min. solo was logged out of the 6 hr. 10 min. flown.

Several members put in useful ground work on aircraft, and others carried on the construction of the Corps hangar.

NORFOLK AND NORWICH

The Aeronca was demonstrated last Thursday by Mr. Bell and Mr. Kirwan. Next Sunday afternoon the club will entertain members of the Comrades of the Royal Air Force.

A large number of pilots is expected to arrive on Friday afternoon for the annual ball at the Samson and Hercules House.

SOUTH COAST

On the whole the weather has shown an improvement, but a gale two week-ends ago stopped all but the most experienced members from going solo.

After 4½ hours' dual, Mr. Cracknell went solo last Wednesday week. Flying times exceeded 20 hr., and Messrs. Stobley and Coombs joined the club.

BENGAL

Although several flying members left Calcutta on account of the Pujah holidays during the latter part of September, 100 hr. 35 min. flying was logged during that month.

Several new members, amongst whom was Princess Ila Devi of Cooch Behar, are taking dual instruction.

Mr. A. P. Chakraborty went solo, Mr. Radi Roy passed his "A" licence tests, and Mr. J. A. Sayer requalified for his Indian "A" licence.

CAMBRIDGE

September and October were the two worst months, so far as weather was concerned, yet experienced by Marshall's Flying School and the Cambridge Aero Club.

Last week, however, two first solos were made by Messrs. Parkhouse and Boden, air taxi trips were made to Heston and Hatfield, and from Heston to Newmarket, and an emergency trip was made to catch the Irish Express at Rugby early on Saturday morning. Flying times last week totalled 22 hr.

KARACHI

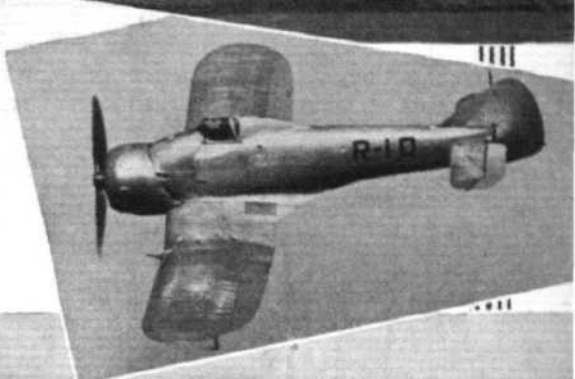
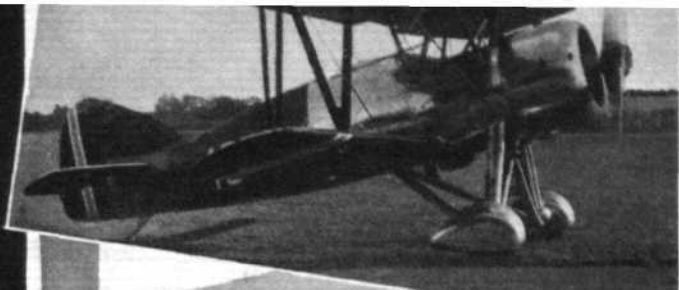
With the passing of the Monsoon, September showed a considerable increase in the club's activities. Flying time amounted to 242 hr. 35 min. and included seven cross-country flights. Early in the month a local business man chartered a machine to fly him to Mandi in Cutch State and last month the club was of some assistance to Imperial Airways, sending a Leopard Moth to Jhansi, carrying one of their mechanics and spare parts.

Climatic conditions in Karachi are, at present, ideal for flying and will remain so for the next six months. The club is now optimistically expecting a really busy season.

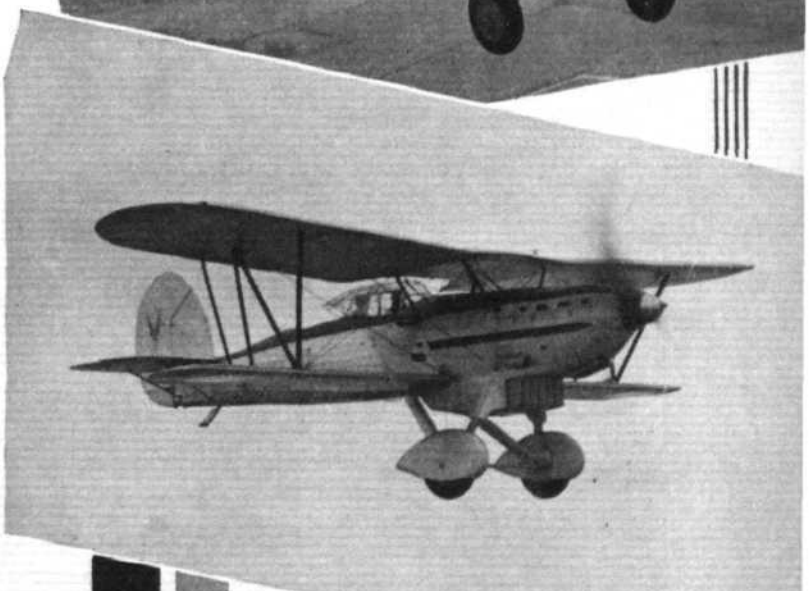
BRISTOL

Light Aircraft, Ltd., of Hanworth, sent an Aeronca monoplane to Bristol Airport for demonstration recently and the machine was flown by several members of the club. Bad weather conditions, however, resulted in practically a blank week so far as club flying was concerned.

Friday, February 28, 1936, has been provisionally fixed for the date of the Bristol and Wessex Aeroplane Club Annual Aviation Ball. Two squash rackets matches have been played so far, the club defeating the Bristol Pure Milk Company by 3 ties to 2, and losing to Weston-super-Mare by 2 ties to 3. Four new members have joined the club, including Mr. M. P. E. Buckingham, who is a pilot member.



THE TREND of SMALL-FIGHTER DESIGN



Biplane or Monoplane? The Armament Question: 300 m.p.h. in Sight: International Practice Reviewed

By H. F. KING

ONE great bar to a designer's freedom of thought in planning a fighter is the fact that the machine will be required to engage two widely differing types of aircraft.

If its sole duty were fighting with its own kind there would doubtless be an accent on manoeuvrability. For chasing bombers, however, a fighter might have to sacrifice a good deal of its acrobatic ability to a very high speed and possibly to a heavier armament and longer endurance.

These remarks apply to both single- and two-seater fighters, although the rear gunner in the latter type endows his machine with certain advantages over the single-seater, particularly as an attacker of bombing formations.

Realising the limitations of the small fighter, certain experts (and who is to say they are wrong?) have advocated the large multi-seater, multi-gun, multi-engined machine. A group of such aircraft flying the same course as enemy bombers could, they maintain, play havoc with their opponents—relying on sheer fire power.

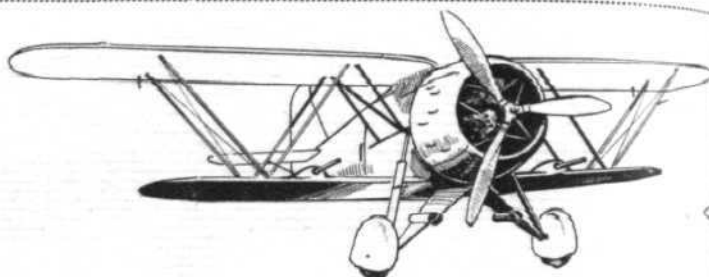
Purely for fighting purposes, the single- and two-seaters still hold the field, and are likely to do so for some years to come.

The two qualities which have been accentuated within the last two or three years are speed and armament; speed because of the great advance in the performance of

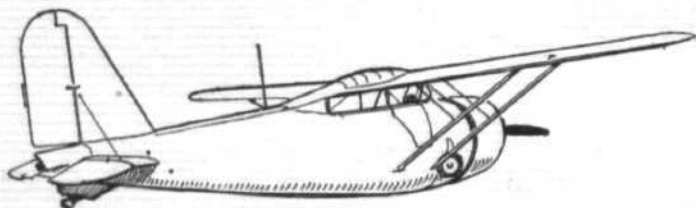
Some Recent British Fighters (Reading from top left):
Fairey Fantome, Armstrong Whitworth Scimitar, Bristol
F.7/30, Westland F.7/30, Gloster Gladiator, Fairey Fox
Mk. VI., Hawker P.V.4 (F.7/30).



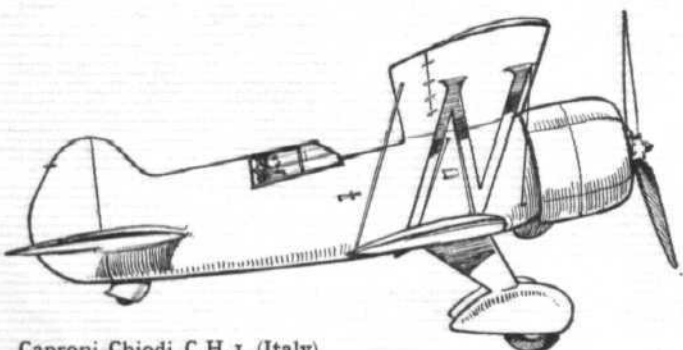
Loire 46 C.1 (France).



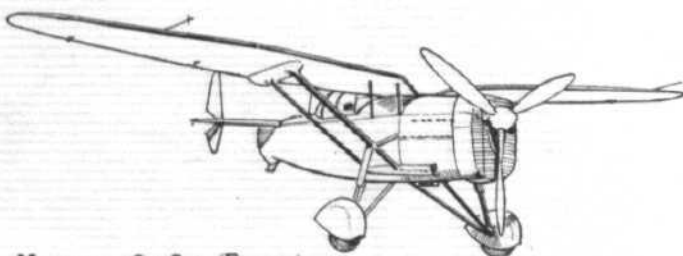
Fiat C.R.41 (Italy).



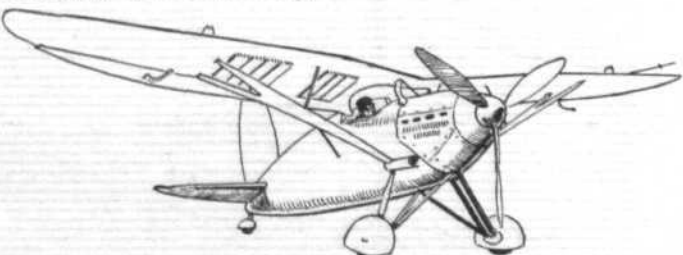
Curtiss XF13C-1 (U.S.A.).



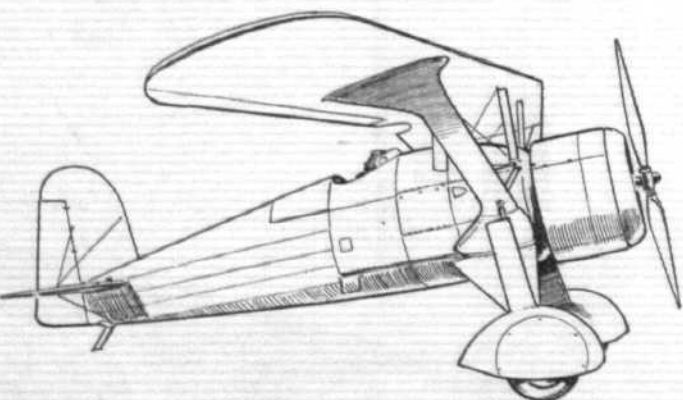
Caproni-Chiodi C.H.1 (Italy).



Mureaux 180 C-2 (France).



Nieuport Delage 125 C.1 (France).



Morane-Saulnier M.S.275 (France).

bombers, and armament because, it is reasoned, the speeds attained in future combats will be so high that the fighter pilot will be able to keep his sights on the enemy for a very short space of time, and, consequently, he should have at his command ample weight of fire.

With speed it is natural to associate monoplanes, and in the quest for additional m.p.h. more and more designers are turning to the single wing. The U.S.A., France, Poland and certain other European countries already have standard monoplane fighters.

The great reduction which is being made in the overall measurements of fighter monoplanes can be seen to advantage in some of the recent American designs, such as the Boeing P-26A and the little Northrop Navy fighter. These are both rather smaller and lighter than our day and night fighters (the all-up weight of the Boeing with maximum fuel is only 3,380 lb. compared with the 3,950 lb. of the Gauntlet), but in span they measure, respectively, 28ft. and 29ft. 8in. A typical figure for a British wire-braced biplane single-seater would be about 32ft.

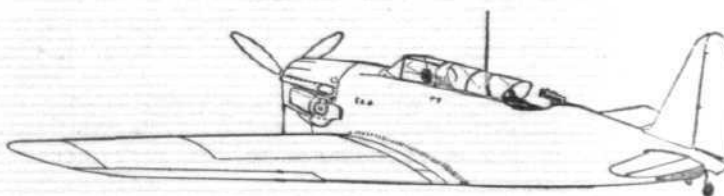
On the whole, the low-wing monoplane is being favoured, but there are one or two refreshing designs incorporating strut-braced high wings.

Gull Wings

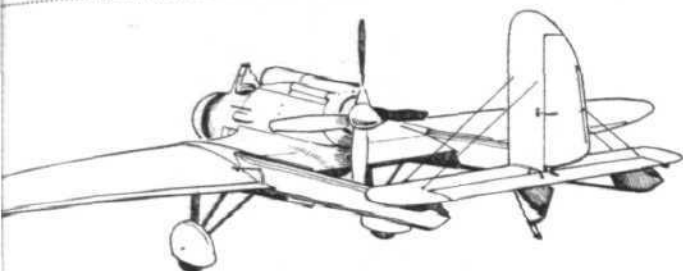
The gull-wing arrangement popularised by the P.Z.L. concern has found considerable favour outside Poland. One of the chief claims made for this layout in a high-wing monoplane is that a wide field of view is obtainable, and there can be no denying that upward and forward outlook is quite exceptionally good. By moving his head slightly the pilot has an excellent view in all directions. All things considered, however, one wonders if the outlook for fighting purposes is very greatly superior to that obtained from the heavily staggered biplane of the type favoured in this country.

Certainly the gull-wing arrangement seems to detract very little from performance. The P.Z.L. P.24, with a 900 h.p. Gnome-Rhone Mistral Major 14 Ksf, is doing 261 m.p.h. at 13,600ft., carrying two Oerlikon "FF" cannons of 20 mm. calibre (mounted in fairings at the junction of the struts and wings) and two machine guns. It takes 11 minutes to climb to 22,960ft., and one understands that it can be landed at about 70 m.p.h.

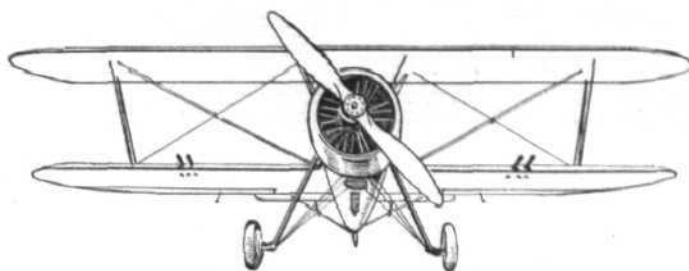
The French Loire 46 C.1 bears a striking resemblance to the P.24. It has a similar engine and armament, but is rather heavier and has a slightly inferior performance in the matter of speed and climb to the Polish product.



Consolidated P-30 (U.S.A.).



Hanriot H.110 C.1 (France).



Letov S.231 (Czechoslovakia).

This Loire machine was actually developed from a Hispano-engined type entered for the French fighter competition two or three years ago. The competition brought forth a number of interesting types, and none more so than the Nieuport Delage effort with an Hispano engine—originally a 690 h.p. "X," and now an 860 h.p. "Y." The manufacturers of this machine made an extremely thorough investigation into the question of visibility and placed the pilot in large cut-out in the high, strut-braced wing.

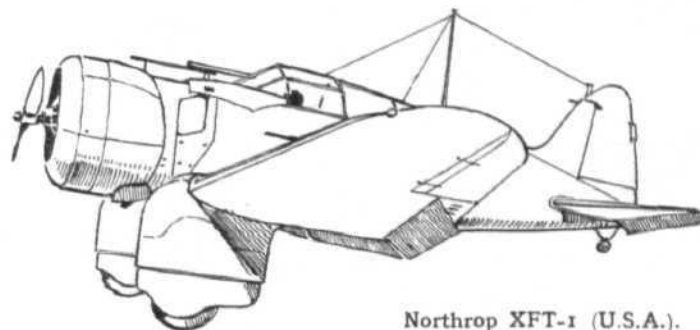
Parasol Types

Of late the Dewoitine Company, which is noted for its low-wing types (the D.500 monoplane has been adopted as standard equipment by the French Government), has produced a parasol-type monoplane, and appears to have obtained highly satisfactory results. The aeroplane is known as the D.37. It has tapered wings, the centre section being carried on four struts, and a wide split undercarriage attached to the main lift struts. A batch has been ordered for use from the French aircraft carrier *Béarn*. For fleet work the type is being armed with four machine guns in the wings, but the Lithuanian Government, which has also ordered a number of D.37's, is specifying six guns—four in the wings and two in the fuselage. When carrying this arsenal, the machine still has an endurance of four hours at cruising speed.

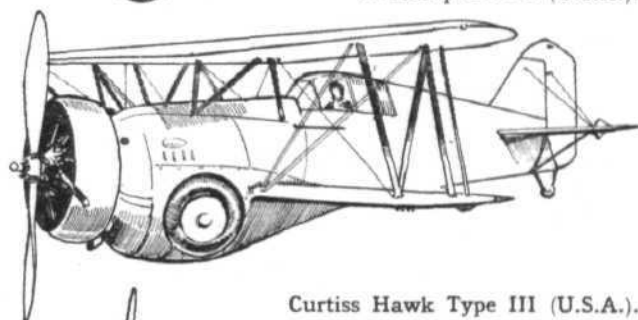
Perhaps the most "eyeable" of the French parasols is the Morane-Saulnier M.S.275—rather smaller and lighter than the type already discussed. Actually it is a development of the well-known M.S.225, which is a standard type in the French air service. Cleaning up and re-engining have added about 20 m.p.h. to the maximum speed and 3,000 feet to the ceiling.

These French high-wings and parasols, interesting as they are, are all much of a muchness so far as general layout is concerned. For a really startling high-wing design one has to turn to the U.S.A.

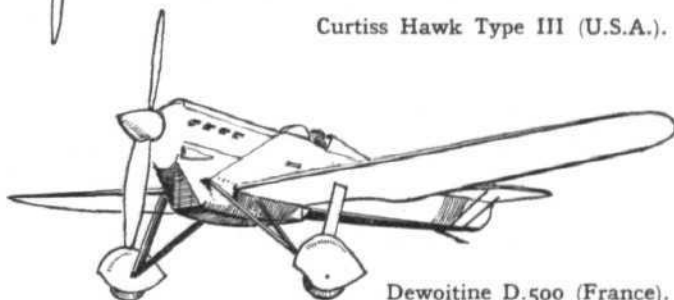
The Curtiss XF13C-1, the machine in question, is a high-wing strut-braced monoplane with slots of the Handley-Page type and trailing-edge flaps. The undercarriage retracts into the sides of the fuselage as in the Grumman scouts and fighters and the Curtiss fighter-bombers already in service with the American Navy. More interesting still, the pilot is seated in a cabin beneath the leading edge of the wing, the top, sides, front and a portion of the rear of the cabin being provided with windows. There are large doors (although how they could be opened against a 350 m.p.h. airstream frankly puzzles one—unless they



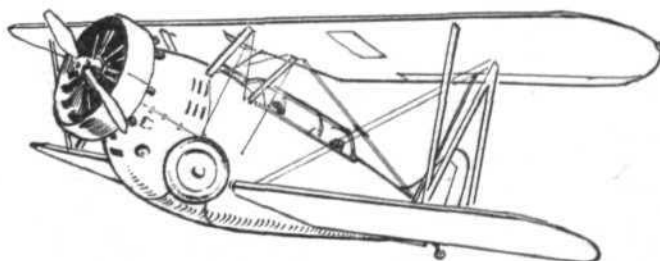
Northrop XFT-1 (U.S.A.).



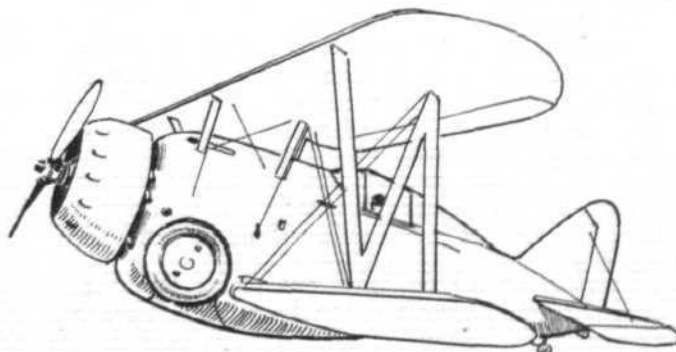
Curtiss Hawk Type III (U.S.A.).



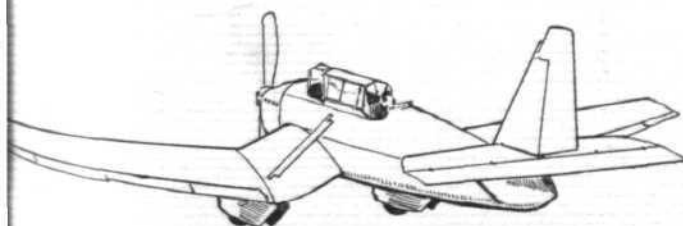
Dewoitine D.500 (France).



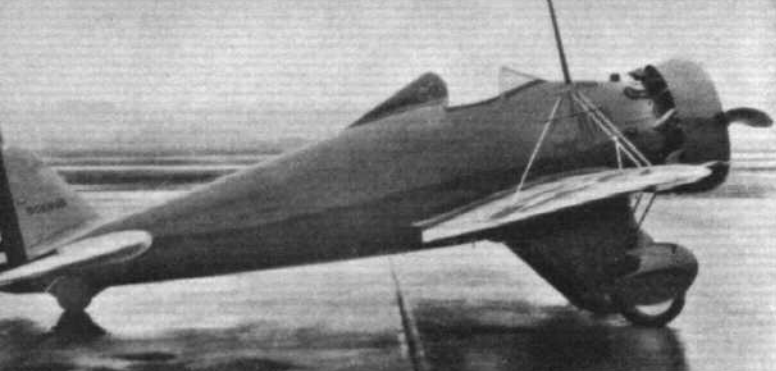
Grumman FF-1 (U.S.A.).



Grumman XF2F-1 (U.S.A.).



Nieuport Delage 140 (France).



This Heinkel (direct drive B.M.W.) is of the type which equips the German "Horst Wessel" squadron. (Above) The Boeing P-26A (Wasp), a standard fighter of the U.S. Army Air Corps. (Right) A Boeing P-12E with an experimental cockpit enclosure.

to regular readers of *Flight* and is of interest because its low wings are wire braced. This has entailed fitting a fixed undercarriage—of the "treadle" type actually—in order to provide anchorage for the lower bracing wires. Therein, of course, lies one disadvantage of the wire-braced low-wing design. According to some reports, Bellancas are said to have built, recently, a single-seater fighter with a Hispano Y engine. Perhaps they will provide, as in the *Irish Swoop* racer, inverted kingposts for these wires, thereby permitting a retractable undercarriage.

To return to the Boeing. Here is a type in which overall measurement has been kept down to a minimum. Compared with the majority of single-seaters being produced



are completely detachable), and, altogether, it seems a very creditable effort.

There is a French two-seater monoplane fighter, also a high-wing type, but more orthodox in layout, this being the little Mureaux 180 C-2. It has gull wings, strut-braced, of course, an Hispano-Suiza Xcvs 690 h.p. engine with a *canon* between the cylinder banks, complete cockpit enclosure, and twin fins and rudders. These last have only lately been incorporated. Doubtless they are intended to allow a better field of fire for the rear gunner, and, theoretically, the arrangement does permit him to fire directly astern. On the other hand, he has two obstructions to miss when firing to the rear instead of one. The latest high-speed figure taken for this machine is 236 m.p.h.

Low Wings

Low wings are, it seems, proving more popular than high and parasol types in fighter designs. Within the past few years there have appeared in this country the Westland Interceptor, Vickers Jockey and Vireo, Supermarine Spitfire and Bristol F.7/30. None reached the production stage, but all helped pave the way for the "300 m.p.h. jobs" which are the subject of such widespread conversation in the industry to-day. The first three mentioned are (at least, in the form in which they are known to the public) obsolete, but the Spitfire and the Bristol monoplane are more recent types. Both these are of particular interest because of their unusual wing arrangement. From the fuselage the inboard sections were sloped at a negative dihedral angle, forming a more "open" angle at the wing-fuselage junction and permitting a lower undercarriage than would otherwise have been obtained. At the junction of the inboard and outboard sections of the wings came halves of the undercarriage—fixed and trousered in the case of the Supermarine and retractable into fairings on the Bristol. It will be interesting to see if this practice of "cranking" the wings is adhered to in any of the forthcoming types.

It has been—or is being—tried out on at least one French machine—the Nieuport 140 two-seater bomber-fighter for the French Navy.

America and France have both adopted low-wing single-seater fighters—the Boeing P-26A and the Dewoitine D.500 respectively. The former design is already familiar

in England and on the Continent it is a light machine. One might have expected America to have succumbed to the multi-gun mania sooner than any country, but, curiously enough, the great majority of her modern single-seater fighter types, if not all, retain the two Brownings which have been standard equipment for years. It is customary, by the way, to mount a 0.5in. gun with one of 0.3in. bore.

A Hispano Y type *moteur canon*, incidentally, has been shipped to the Curtiss company, presumably for experimental work.

The P.26A is not the Boeing company's latest effort, cantilever monoplanes having been produced for the U.S. Army and Navy. These have completely retractable undercarriages and the pilot is seated well forward, close behind the Wasp engine.

The little Northrop Navy fighter already mentioned (a description was given in *Flight* of September 19 this year) is striking not only for its compactness but because of its resemblance to the large Northrop commercial types.

Italy has an interesting wire-braced low-wing single-seater in the Breda 27. In general layout it resembles the little Boeing but is a somewhat larger and heavier machine, using a Bristol Mercury-type radial built under licence by the Alfa Romeo Company. With one of the later marks of this engine the machine does just under 250 m.p.h. The Chinese Government has ordered a number for its air force.

A particularly graceful low-wing fighter is the Dewoitine now going into service in France. Both Hispano "X" and "Y" engines are being specified for the production machines, but the majority, it is understood, are having the smaller engine. The beautifully made cantilever wing is built round a central girder, and the fuselage is an oval monocoque structure.

French constructors, as we have seen, have been making strenuous efforts to provide good visibility from their fighters. One manufacturer, Hanriot, went so far as to build a pusher—the H.110C.1, with Hispano "X" type engine. The tail was carried at the extremities of two booms, and the pilot was seated forward of the leading edge of the wing. A description was given in *Flight* of February 22, 1934. The performance of this highly interesting aeroplane was not, as might be expected, quite up to that of contemporary tractor fighters with similar engines. Actually, the machine did 220 m.p.h.

Two-seater fighters are coming into their own, not only

with the R.A.F. but in the U.S. Army Air Corps. A comparatively small number of B./J. two-seater pursuit machines (biplanes with Conqueror engines and gull-type top planes) was put into service a few years ago, mainly, one suspects, as an experimental measure. Like the original Hart Fighters (which later became Demons) in the R.A.F., they proved successful, and led the U.S. Army to hold a competition for two-seater pursuit machines of later design. The successful entrant was the Consolidated Company with its P-30 machine.

A highly interesting type, this, with low cantilever wing, stressed skin construction, fully retractable undercarriage, and a Curtiss Conqueror liquid-cooled engine with an exhaust-driven supercharger mounted on the port side. Very large contracts for this type are now being fulfilled. No performance figures have officially been released, but one understands from what should be a reliable source that the prototype P-30 did 252 m.p.h. Three Browning guns are specified—two fixed for the pilot and one free on a track-type mounting. Complete cockpit enclosure is embodied.

The standard two-seater fighter issued to the R.A.F.—the Hawker Demon—is, of course, a biplane. It is by no means a new design, although large numbers are still being built under the expansion scheme. With the 600/640 h.p. Kestrel VI a maximum speed of about 200 m.p.h. is attained at 15,000 feet. Its manoeuvrability is unquestioned, and doubtless it is superior on this score to a machine like the Consolidated. But we must look ahead. At least another 75 m.p.h. will be required in our next standard two-seater fighter. Will it be another biplane or will its general layout follow that of the Consolidated?

Belgium has in service a number of Fairey Foxes which she classes officially as reconnaissance machines, but which are potential two-seater fighters (and, for that matter, light bombers) of very high quality. Hispano Suiza "Y" type engines are being installed in a number of these machines, and with this unit a speed of 220 m.p.h. is attained. The climb to 19,680 feet occupies 8 min. 24 sec.

Single-seater Biplanes

Of the world's fighters the biplane single-seater still predominates in numbers, and it is in this country that the type can be seen at its best.

Under the expansion scheme there are being ordered Hawker Furies and Demons and Gloster Gauntlets and Gladiators. These machines, in the order given, are the latest fighter types to be adopted by the Air Ministry.

In general layout the Fury is a very heavily staggered fabric-covered biplane with single-bay wings, and the pilot is seated behind the trailing edge of the top plane. The engine now being ordered by the Service for the Fury is the Rolls-Royce Kestrel VI compositely cooled unit rated at 600 h.p., and giving a top speed in the neighbourhood of 240 m.p.h.

In the F.7/30 competition the Hawker Company had a machine built on the lines of the Fury, but larger and heavier to permit the carriage of a substantially greater military load. In this model the Rolls-Royce Goshawk was installed and four synchronised machine guns were mounted. Sweepback was given to the top planes, but otherwise the machine resembled a scaled-up Fury. With the new Goshawk B engine this machine is to-day one of the fastest fighters in the world. Will it be the last Hawker single-seater biplane?

Glostons are noted for their extremely handy and docile biplanes, and have achieved particular success with the radial engined types.

The Gauntlet is a direct descendant of an interceptor fighter known as the S.S.18 which was built for the Air Ministry competition, in which the Fury was successful. Its two bay-wings make for exceptional strength and rigidity, and, in spite of the necessary profusion of struts and bracing wires, the machine is capable of performances equal to those obtained in certain foreign monoplane fighters with liquid-cooled engines giving approximately the same output as its Bristol Mercury VI.

For the F.7/30 competition the Gloster Company entered a development of the Gauntlet, which, proving successful, was ordered in quantity and given the name Gladiator. The most notable alteration is in the wing cellule: the new machine has only one pair of struts on each side of the fuselage. A larger military load is carried, including four Vickers or Browning guns. Two of these are in the fuselage, and the others are mounted, partly in fairings, beneath the lower planes.

The latest product of the Fairey Company to be seen in public was the Fantome, a heavily armed single-seater biplane produced for a Belgian competition. This machine differed in a variety of ways from the Fireflies. It had a pronounced dihedral angle on the lower planes instead of the upper ones, as on the Fireflies. A cantilever undercarriage was fitted and the engine was a 690 h.p. Hispano-Suiza 12 Ycra liquid-cooled type, with a 20 mm. canon mounted in the V of the cylinder banks and firing through the airscrew shaft. In addition, four rifle calibre Browning machine-guns were fitted.

Foreign visitors to this year's S.B.A.C. display were impressed by the extreme manoeuvrability of the Armstrong Whitworth Scimitar fighter biplane, a type which has been adopted as standard equipment by the Norwegian Government. Basically the Scimitar is a modern version of the A.W.XVI built some years back. To the eye perhaps the most striking feature is the hump immediately in front of the pilot which contains the breeches and part of the barrels of two synchronised machine guns.

An extraordinarily interesting Blackburn fighter was recently produced for the F.7/30 competition. It was a biplane with the top planes sprouting out from the fuselage below the level of the pilot's cockpit. The lower planes were similarly beneath the fuselage although they were joined to it by the radiator structure.

It is a somewhat startling fact that Great Britain, with her weakness for biplane fighters, has never fitted one with retractable landing wheels. Retraction is by no means an easy task on a biplane, although in the U.S.A. a number of machines have wheels which can be raised into wells in the side of the fuselage.

Notable among these are the weird Grumman single- and two-seater Navy fighters and the latest version of the Curtiss Hawk. Figures supplied by the Curtiss Company for the Hawk, with and without retractable landing gear, indicate a gain of about 20 m.p.h. when the latter is fitted.

A startling single-seater fighter biplane has just been built in Italy by the Caproni concern. Known as the Caproni-Chiodi C.H.1, it mounts the big Gnome Rhone K.14 radial, has heavily staggered wings, a cantilever undercarriage and a cockpit well behind the wings, merging into the tail à la Gee Bee. At 15,400 feet it is said to be capable of rather more than 270 m.p.h. It is a handsome aeroplane, but outlook for the pilot is not one of its strong points.

It has been possible only to touch on some of the salient features of a few of the world's latest fighter designs. Aeroplanes in the fighter class which are being constructed in this country, and doubtless throughout the world, and which should be flying within the next six months, are confidently expected to put up performances which will completely overshadow anything obtained with the machines which have been dealt with here.

In all probability the majority will be monoplanes. Both liquid- and air-cooled engines will be specified, retractable undercarriages and flaps will certainly come into greater prominence, and slots too will doubtless be seen in more profusion. Fighters with canon engines are likely to be seen in service within, say, eighteen months, and there seems a strong possibility that the pluricanon machine will be adopted as standard equipment by certain Continental air services. In this country a still greater number of high-speed machine guns will almost certainly appear. More two-seater fighters will be built by the majority of the Powers, particularly for fleet work, and it should not be long before the monoplane is accepted for carrier operation.

IN the EAST, 1917-1918

Some Vividly Interesting Accounts from the Penultimate Volume of the Official History of the War in the Air

The War in the Air. Vol. V. By H. A. Jones (Oxford, at the Clarendon Press). 17s. 6d., or with map volume, 30s.

VOLUME V of the official history of "The War in the Air" is apparently the penultimate volume of this great work. It deals with the year 1917 and part of 1918, and has 471 pages, apart from appendices. A separate volume of maps gives with approximate accuracy the course of all the air raids over Great Britain in the years 1917-18, and the first 150 pages of the book deal with this subject. Compiling this record must have been an exacting task, for German archives, as well as British ones, had to be studied and compared. Everyone who has a special interest in any particular raid will be able to find a full account of it in this book. For those who have to take precautions for the future this record should be invaluable. The general reader will probably skip most of it.

From valuable but rather dull records the book suddenly turns to subjects of thrilling interest, the air side of the campaigns in Egypt, Palestine, Mesopotamia and Macedonia, and R.N.A.S. operations in the Mediterranean and Indian Ocean. It is much more interesting to read about (as well as to take part in) a war of movement than a war of trenches. This inevitably makes this volume more readable than those which deal with the Western Front, and possibly the writing becomes more vivid from the fact that Major Jones himself served in Macedonia and was seriously wounded while flying as an observer of No. 47 Squadron in August, 1917. The town of Prilep was bombed by five machines of No. 47 Squadron escorted by three Nieuports of No. 17 Squadron. A French squadron of fighters was to have accompanied the raid but failed to find the formation. On the way back it was fiercely attacked, and one Nieuport was shot down. The only two-seater in the raid was an A.W., and it covered the rear until the pilot, Lieut. F. W. H. Thomas, was mortally wounded and Lieut. Jones seriously wounded. The heroic pilot managed to reach his own aerodrome fifty minutes after being hit.

Desert Difficulties

The first campaign in the East was the Turkish attack on the Suez Canal. This was followed by operations against the Senussi and the expedition against Ali Dinar of Darfur. In these campaigns the British aeroplanes had no opposition, though great technical difficulties had to be overcome by No. 17 Squadron in the western desert. In all cases the air reconnaissance was invaluable to the British generals.

When the British began to advance across the Sinai peninsula and to invade Palestine, the Germans sent aeroplanes against them. The British policy was to send to the Eastern fronts types of machine which were obsolete in Flanders—Farman Longhorns, B.E.2.Cs, and, at best, B.E.12 single-seater fighters. This was all very well so long as there was no opposition but when the Germans took an interest in the Turkish and Bulgar operations they always sent a few up-to-date fighters and bombers, which outclassed the British

machines, hampered their work and inflicted casualties. Major Jones concludes that in the air numbers and gallantry cannot compensate for technical inferiority in types of aircraft and engines.

Certainly Major Jones brings out what was not generally realised before, how that in the desert campaigns every British success was based upon the information supplied to the staff by the reconnoitring aircraft. When the air reconnaissance failed the British armies failed likewise. The most striking instance occurred in Gen. Townshend's advance from Kut al Imara to Ctesiphon. Before the attack on the Turkish positions at Ctesiphon, Major Reilly, R.F.C., who had done some excellent reconnaissance work, flew in a Martinsyde over the Ctesiphon positions, and discovered that formidable reinforcements had reached the Turks. Then a splinter of an anti-aircraft shell hit his engine and brought him down in the Turkish lines. Another observer who flew over the position was inexperienced in army co-operation work, and did not realise the significance of what was spread out beneath him. So Gen. Townshend attacked and failed with heavy loss, and then was himself besieged in Kut, where he was ultimately forced to surrender with a force of 12,000 officers and men, of whom over 4,000 succumbed to the rigours of their treatment by the Turks. All this might have been saved if Major Reilly had been able to get his report home.

Revictualling Kut

In a review of this length it is impossible to mention all the significant events of the air work and all the stirring deeds of the airmen, but mention must be made of the attempts to revictual Kut by aeroplane during the siege. Gen. Townshend reported by wireless that he would require 5,000lb. of food-stuffs a day. Four B.E.2.Cs of No. 30 Squadron, two R.N.A.S. landplanes (a Voisin and a Henry Farman) and three Short seaplanes were allotted for food-dropping. In all, 140 food-dropping flights were made between April 15 and 29, and the largest amount dropped on one day was 3,350lb. One seaplane was shot down by an enemy fighter, and a B.E.2.C. was damaged by bullets. The machines and the engines were unsuitable for the climate of Iraq, with its extremes of temperature. Officers and men worked feverishly day and night to keep them in some sort of flying condition. "Aware that the starving garrison in Kut had reached the stage when they depended entirely on such food as could be dropped from the air," writes Major Jones, "the men had worked unsparingly and pilots and mechanics who were sick to exhaustion had spurred themselves to keep going so long as the urgency remained." After the surrender of Kut they collapsed, and nearly all the pilots and many of the rank and file had to go to hospital. The British world was so horror-struck by the tragedy of Kut and the dreadful sufferings of the prisoners that this side of the siege has not before been realised. It is well that it should now be put on record.

F. A. de V. R.

Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in the list.

Nov. 13. Royal United Service Institution Lecture: "Oil from Coal in War Time," by Col. W. A. Bristow, at 3 p.m.

Nov. 14. British Empire League Lecture, "The Air Defence of the Empire," by Air Comdre. J. A. Chamier, 5 p.m., British Empire Club, St. James's Square, London.

Nov. 18. R.Ae.S. Lecture: "Cooling Problems with Particular Reference to the Work of the 24-ft. R.A.E. Tunnel," by Dr. G. P. Douglas, 6 p.m., Institution of Electrical Engineers.

Nov. 19. R.Ae.S. Students' Section Lecture: "Tapered-wing Stalling," by P. P. Nazir, 7 p.m. R.Ae.S. Library, Albemarle Street, London, W.1.

Nov. 21. R.Ae.S. (Coventry Section) Lecture: "Carburation and Engine Controls," by Lt. H. Cantrill, 8 p.m., Armstrong Siddeley Canteen.

Nov. 29. Yorkshire Aeroplane Club. Annual Ball, Hotel Majestic, Harrogate.

Dec. 2. R.Ae.S. Lecture: "Undercarriage Design," by G. H. Dowty, 6 p.m., Institution of Electrical Engineers.

Dec. 6. Hampshire Aeroplane Club: Tenth Annual Dinner and Dance, South Western Hotel, Southampton.

Dec. 16. R.Ae.S. Lecture: "Wireless and its Application to Commercial Aviation," by Capt. J. M. Furnival, 6 p.m., Institution of Electrical Engineers.

Dec. 19. R.Ae.S. (Coventry Section) Lecture: "The Stratosphere," by Capt. J. Lawrence Pritchard, 8 p.m., Armstrong Siddeley Canteen.

Dec. 20. London Aeroplane Club. Annual Ball, Park Lane Hotel, London.

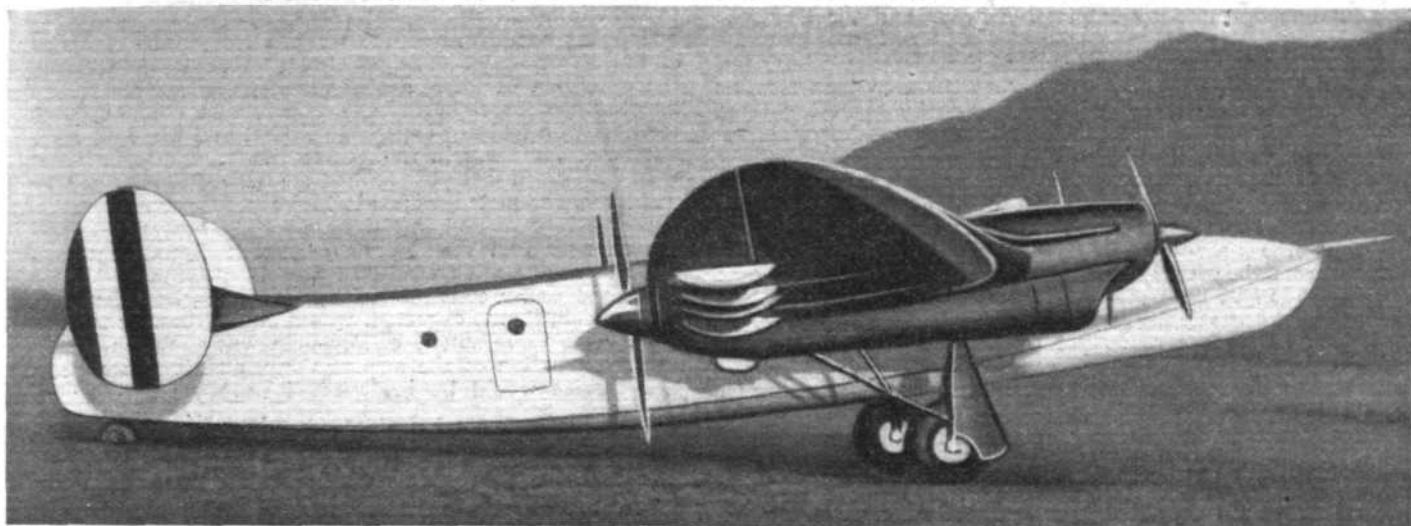
1936.

Jan. 22. Royal United Service Institution Lecture: "The Expansion of the Royal Air Force," by Air Marshal Sir C. L. N. Newall, at 3 p.m.

Mar. 10. Royal United Service Institution Lecture: "The Development of Civil Aviation," by Lt. Col. F. C. Sheldermine, at 3 p.m.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



OUT OF THE RUT : This is the machine which the Italian Piaggio concern has designed for Transatlantic work. It should cruise, they say, at about 250 m.p.h., and it is intended that the crossing should be made "in stages." There are four liquid-cooled Isotta Fraschinis giving a total maximum power of 3,360 h.p. It appears that the hull is specially designed to facilitate emergency alightings on water. One notable feature not apparent in this view is the negative dihedral angle on the inboard sections of the wings.

IMPERIAL EXPANSION

New Government Agreement With Imperial Airways : Atlantic Prospects : The New Fleet : Sir Eric Geddes' Review of the Position

PAST experience and future plans were outlined in Sir Eric Geddes' speech at the Eleventh Ordinary General Meeting of Imperial Airways, Ltd., last Thursday. After the secretary had read the report of the auditors, the chairman mentioned the new long-term agreement with the Government.

The company's operations to-day, said Sir Eric, were founded, in the main, upon two agreements with the Government—one for the European services and the England-India service, and the other for the England-South Africa service. The former was of ten years' duration and expired in 1939; the latter was of five years' duration and expired in 1937.

It would, of course, upset the continuity of progress if these agreements were allowed to lapse, or nearly lapse, before arrangements were made for the services to be continued.

For some time past these matters had been under discussion with the Government. The company had been informed officially of the Government's decision that it was to continue as the Government's chosen instrument for the development of the existing Empire lines.

The principal features of a long-term agreement had been agreed upon. Beyond that he was not in a position to say much, except that, with the knowledge and consent of the Government, they had placed orders for new aircraft.

Further capital would be required next year to carry into effect these developments. When that time arrived the agreement with the Government would have been completed.

Sir Eric Geddes then went on to explain the financial position, and stated that a sum of £50,000 had been appropriated from the available balance for the purpose of staff superannuation. He paid the highest tribute to the work of both flying and ground staffs. The board had placed £30,000 in reserve for contingencies.

Recommending the payment of a dividend of 6 per cent., plus a bonus of 1 per cent., he emphasised the need for following the same conservative financial policy that had always been pursued.

After referring to the zone flat rate scheme for Empire air mails, which had shown itself to be very much appreciated,

coinciding as it did with the duplication of services, Sir Eric spoke of likely developments in the matter of air mails since the Government had decided that in the future all letter mails within the Empire would, as far as was practicable, be carried by air.

Since the present accommodation at Victoria and in Charles Street had become uncomfortably overcrowded, a new London terminus was to be built, and negotiations for a suitable site were already in progress. With due regard for economy, the new building would, he hoped, be a fitting air terminal for the greatest city in the world.

Progress in Europe

During last year the traffic carried on the European services had not only been maintained, but somewhat improved, and in spite of increased competition at lower fares. The company had ordered new aircraft for the European services, which would be larger and much faster than the existing main line fleet. During the current year activities in Europe had been extended by a new line between London and Budapest. The evening service between London and Paris, which now operated all the year round, was proving popular.

The development of faster and more economic aircraft, which cheapen the cost of operation, the development of still more reliable engines, and the improvement of wireless and meteorological organisation, together had made European services in general sufficiently regular, in night as well as day operation, to warrant postal administrations making greater use of them than they had done hitherto. He looked forward to a brighter future for the European services.

Under the European section of the agreement with the Government the company was obliged to fly annually a fixed minimum which was represented by a figure of 425 million horse-power miles. In fixing this minimum, however, the Government had in mind that the company would use their best endeavours to increase the scope of operations in Europe as and when it became financially and technically practical to do so. There could be no doubt that the company had faithfully carried out not only the letter, but the spirit of the agreement. Sir Eric then gave a series of interesting and encouraging

Commercial Aviation

ing traffic figures covering the past eleven years. During the period the amount of traffic had been almost trebled.

The Government was under an obligation not to subsidise any other company operating services in Europe. The Government had now, however, expressed a desire to be free from that obligation in respect of Continental lines north of the London-Berlin line. The board had expressed its willingness to fall in with the Government's wishes.

Arrangements were under discussion with the Postmaster-General for the carriage of the bulk letter mail without surcharge between London and Berlin by night, the service to be a joint one operated by Imperial Airways and the Deutsche Luft Hansa.

With the ever-increasing growth of the company's business, the board recently decided to separate the European services from the other activities of the company by operating them through the medium of a subsidiary company—Imperial Airways (Continental), Ltd.

Sir Eric then went on to review the African and Eastern developments and the duplication of the service as far as Singapore. The Qantas section was expected to be duplicated in the near future. The company was progressing rapidly from the strictly economic point of view and the cost per ton mile had been reduced by more than half in the last ten years of operation. Insurance costs, too, were lower, and had been reduced from 20 per cent. to 3 per cent. on the value of the fleet during the past eleven years. Passenger insurance rates were the same as those for land or sea travel. The use of multi-engined machines had firmly established the confidence of the general public, and machines were being used twice as intensively as they were used ten years ago. One particular machine exceeded 2,000 hours' flying in the year.

The difficulty which arose with France in regard to permission for services to cross that country had now been overcome, and the company had been able to commence in a preliminary way flying between London and Brindisi. The progress which had taken place in the development of more reliable and more economic aircraft had brought them to a point when it would now be cheaper to fly the whole way.

A Single Base

When Empire services were being established there was no practicable alternative to the subdivision of the routes into sections, each of which was operated with a separate fleet. This necessitated the establishment of overhaul bases away from economical sources for the supply of materials, and where living conditions for British staff were difficult and salaries were necessarily much higher than at home. The next step would be to fly the whole way with a fleet based on the United Kingdom.

Sir Eric then alluded to the establishment of an air connection between Khartoum and Nigeria. This, he said, would eventually terminate at Lagos, but, owing to the lack of suitable aerodromes, Kano would be used initially. Elders Colonial Airways would develop feeder services.

While endeavours were being made to overcome political difficulties with Siam and China, an experimental service between Penang and Hongkong, avoiding both Siamese and Chinese territory, was being run. Sir Eric then referred again to the subsidiary companies.

The company had placed an order for the Mayo Composite Aircraft, which had been specially designed to meet the conditions of an Atlantic air mail service. (Comments on this development appear on pp. 476-7-8.) At the same time, the company had under construction a flying boat of normal charac-

teristics, but of sufficient range to fly the Atlantic, and this boat should be delivered in time to carry out a number of experimental Atlantic flights next year.

There were other problems to be solved in regard to the Atlantic besides those of a purely technical and financial nature. Other countries besides our own and those within the Empire had an interest. This aspect of the problem was not being neglected, and negotiations which began some years ago were still being pursued. Two small aircraft were already being operated in Newfoundland on behalf of the Newfoundland Government. These operations would doubtless bring to light information of great value in regard to meteorological and flying conditions at the western end of the ocean sector of the direct route. The political complications incidental to the operation of international air services and the time that negotiations for right of way take would come as a shock to those who had not experienced them and who had made no allowance for them in their calculations.

In his speech last year he had mentioned that arrangements had been completed with his Majesty's Governments in the United Kingdom and in Bermuda for the company to operate a passenger and mail service between Bermuda and New York in co-operation with Pan American Airways. The company had under construction a large flying boat for this service, which, it was expected, would be delivered in the coming year. The Government of Bermuda was about to commence the construction of the airport there, and it was hoped that this service would be inaugurated next year.

The New Fleet

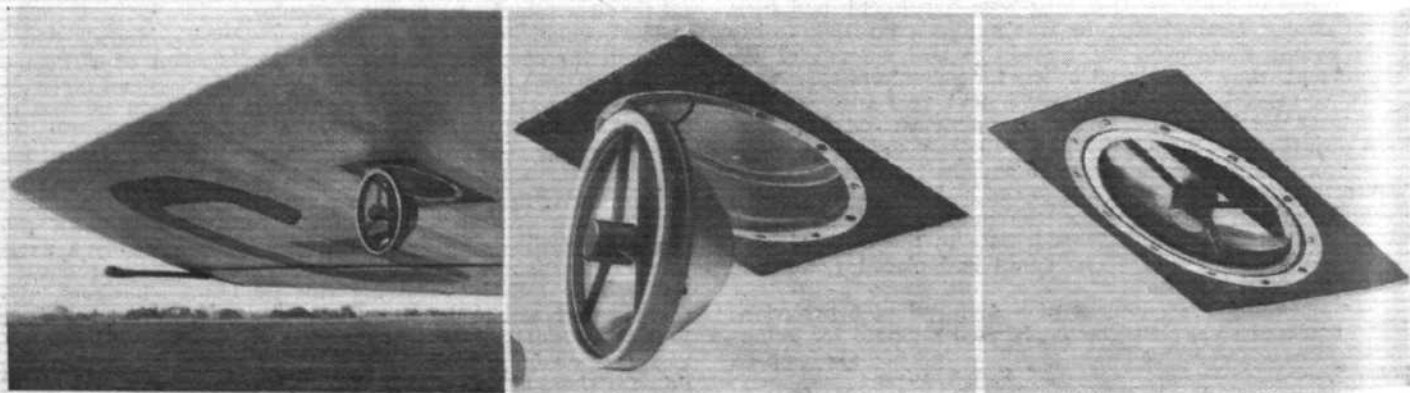
In addition to these aircraft and to those replacing the European fleet machines had also been ordered to replace the main line Empire fleet. These would have a carrying capacity of 3½-5 tons, according to the amount of fuel carried. The standard of accommodation for passengers would be superior to anything yet seen in aircraft, and they would be suitable for flying by day or by night.

People who use the services were more interested in the time taken for the journey than in the actual speed of the machines. The speed of the new fleet would, nevertheless, be appreciably higher than that of the machines operating at present. Subject to suitable ground organisation the speed of these new aircraft would enable them to operate a service between here and Australia in seven days, and between here and South Africa in four days, and between here and India in three days. Even those time schedules could be improved upon with adequate ground organisation.

High air speed and flying by day only were much more costly than the provision of ground organisation and passenger comfort, which would enable the aircraft to fly through the twenty-four hours of the day.

The work of the captains was becoming more and more highly specialised. They had found it necessary to establish their own finishing school for captains and first officers. They did not undertake *ab initio* training of pilots; in fact, no pilot was acceptable who did not possess substantial flying experience and a good record. He must serve as a first officer for a long period before rising to the dignity of captain of an aircraft on the Empire services.

The board suffered a great loss early this year in the death of Colonel Barrett-Lennard. Colonel Lennard made a serious study of the company's problems, both technical and commercial. To fill this vacancy the board appointed Sir Hardman Lever, Bt., K.C.B., and also decided to fill the remaining two vacancies, and accordingly appointed the Hon. Esmond Harmsworth and Mr. Irvine C. Geddes.



RETRACTABLE: Three views of the Grimes landing light which is described on the following page. (Flight photographs.)

THE WEEK AT CROYDON

Exclusively for Mails : "Low" Flying : Really Commercial : A Charter Agreement : Precious Cargo

DURING the week the Vickers Velox arrived at Croydon for delivery to Imperial Airways. The machine will live up to its name if, as stated, it cruises at 140 m.p.h. The Velox is entirely a mail carrier, fitted for the purpose and without passenger accommodation. Possibly the arrival of this machine and the use to which it is to be put forecasts the day when G.P.O. sorters will work in machines as they fly.

For the first time it has now been found necessary to supplement the Imperial Empire 12.30 p.m. departure with a machine exclusively for mail carriage.

Incidentally, the tail unit of this machine is a trifle complicated in appearance although highly efficient, and this caused someone to ask the delivery pilot whether the canary was not included because, said he, "the cage looks sort of lonely without a bird on the perch."

Co-operation

In winter time the K.L.M. homeward-bound machines on the eastern route do not connect with London on the day of arrival in Amsterdam. After all, the Dutch service is not Batavia-England but Batavia-Holland, and this, incidentally, is the answer to the nonsense one sometimes hears about comparative times to and from the East. Anyway, to show the excellent co-operation between air companies, it may be mentioned that if weather is favourable at the time when the homeward Dutch machine reaches Marseilles and when seats are available in the Paris-London Imperial machine leaving Paris at 7 p.m., the K.L.M. Douglas will land at Paris and transfer the passengers before flying on to Amsterdam.

The increasing confidence on the part of the travelling public in winter flying is clearly indicated by the large bookings by the various companies for the longer journeys.

It must have been with tongue in cheek that the Air Ministry recently wrote to two well-known air companies regarding a low flying complaint from somewhere in Kent. The evidence offered was that of a gardener. This particular horticulturist, who operated only in fine weather, collected a mass of low-flying evidence and stated that, though he had no idea of the height of an aeroplane, he knew they flew low because he could see the registration lettering with the naked eye in

every case in clear weather. Registration letters can be read at 2,000 ft. in such circumstances, and the gardener had quite a number of mistakes in his list. Eventually it will be realised that air transport is too important to be interfered with in this way.

Capt. "Bill" Ledlie, of Olley Air Service, had a job last week which provided one more example of the value of air transport to commerce. He flew a party of business men and a cinema operator with his apparatus from London to Eindhoven, Holland, where a film of a new commercial process was shown to a number of Dutch and German business men.

On November 1 British Continental Airways inaugurated their new London-Antwerp-Amsterdam line. I am told that K.L.M., according to pleasant Continental custom on such occasions, "said it with flowers" which arrived by air addressed to the directors of British Continental. Capt. Hattersley tells me that he had a very warm welcome in Amsterdam, especially from K.L.M. pilots.

What may be termed a gentleman's agreement has been reached by three well-known Croydon companies. They are Olley Air Service, Surrey Flying Services, and Wrightways. On the vexed question of charter prices, these firms have agreed to charge the same figure in all cases, whether special charter, instruction or freight carriage. They remark, in unison, that whatever else may vary operational costs do not, and that only by ensuring reasonable profits can they assure the client of first-class service.

Several companies at Croydon have recently brought in some remarkably precious cargo for the Exhibition of Chinese Art at the Royal Academy. Customs demand evidence that antiques are more than a hundred years old, and this causes loud laughter at times amongst professors of ceramics to whom Ming dynasty bowls and so forth are consigned. Customs will have their little joke.

The Croydon Airport dance was a great success last Friday, and some three hundred people were present.

Air Taxis had a rush job last week when a client missed his train for the Cambridgeshire, took a taxi to Croydon, hired an air taxi, took off just after 2.45 p.m. with Mr. Slocum at the controls, and landed on or near the racecourse with two minutes to spare before the big race.

A. VIATOR.

A Retractable Landing Light

CHARTER pilots and, in particular, those who operate machines on which it is not possible to fit a headlamp in the nose, will be interested in the Grimes landing light, which is normally retracted flush with the underside of the wing. The movement of a single switch by the pilot lights the lamp, which has a hemispherical reflector giving a parallel beam, and causes a small electric motor to wind it into position in the airstream. The movement in this direction occupies six seconds.

A pair of these lamps weigh only 8lb. and cost £35, while the depth of wing needed to accommodate the lamp in the retracted position is little more than 4in. The Grimes light has been successfully used in America for some time.

Mr. F. J. A. Cameron, the private owner, is the sole concessionaire for this country and further information can be obtained, and a demonstration arranged, by application to him at 4, John Street, London, W.1. Two examples are at present fitted to his Leopard Moth (see page 488).

Ex-Heston

AIR COMMERCE has undertaken the flying for the National Government in the forthcoming General Election. Earnest supporters of that Government will be glad to know that its leaders are not likely to arrive deafened or frozen at their constituencies, as Air Commerce uses Monospars for the greater part of its private work.

Ft.-Lt. J. Pugh, flying a United Airways machine south from Liverpool on October 29, reported his instruments frozen up at 7,000ft. above the clouds, and asked for his position. Heston, working in conjunction with Bristol and Hull, gave it to him as six miles east of Rugby. Ft.-Lt. Pugh came down through the clouds when he judged himself over Aylesbury, and found the town beneath him. Most other pilots on

that day were flying below the clouds, but it was surprising to hear of frozen instruments at only 7,000ft. on a day which was almost oppressively mild at ground level.

Mr. Harold Farquhar, First Secretary of the British Legation at Mexico City, landed at Heston in his Beechcraft at 14.46 on October 29 after a trans-Asiatic-European holiday flight. He was accompanied by Herr Fritz Bielar.

Yet Another

IMPERIAL AIRWAYS' run of bad luck, it can only be hoped, was completed with the crash of the A.W. Atalanta at Kisumu. The machine hit a tree while taking off in the very early morning in an attempt to make up lost time on the south-bound service, but no one was seriously injured.

Reliability

DURING the week of August Bank Holiday the four Airspeed Couriers and one Envoy used by Portsmouth, Southsea and I.O.W. Aviation, averaged 19.25 hours of flying and 2,050 miles per day. In July and August the undercarriages of the five machines were raised and lowered exactly 5,718 times without mishap or failure.

Keeping Schedule

COMMANDER HULSEBOS, of K.L.M., with the *Kieviet* (*Lapwing*) was held up one day for bad weather on the way from Medan to Rangoon with the homeward Eastern mail service.

On the following day he made a remarkable flight, leaving Alor Star early in the morning and arriving at Jodhpur according to the original schedule on the same night. He made the necessary calls at Bangkok, Calcutta and Allahabad, and his day's flight covered 2,600 miles.

Commercial Aviation

The "B" Licence "Medical"

THE arrangements, by which pilots requiring medical re-examination for "B" licence renewal may be examined at R.A.F. Stations, have been further extended. A list of the new stations where such examinations may be arranged and details of the requirements will be found in *Notice to Airmen*, Number 138.

The New Training

IMPERIAL AIRWAYS' flying boat policy has brought up another training problem. Actually the two old Short Calcuttas are to be used for the necessary flying boat instruction, which will be carried out by Air Service Training, Ltd., at Hamble.

The slipway there is being extended and one of the Calcuttas is, as previously reported in *Flight*, already being fitted with Armstrong Siddeley Tiger engines. A.S.T., of course, already use a Saro Cloud for such training.

Guernsey's Airport

THE States of Guernsey last week decided by twenty-six votes to twenty-five to adopt, as the site of the proposed aerodrome, an area recommended by a report of Messrs. Norman, Muntz and Dawbarn, and situated at La Villiaze, an agricultural district on the top of the island.

This site will allow for four runways of from 650 to 850 yards, with excellent approaches from every direction. A committee was appointed to deal with many matters resulting from this decision, among the most important being the expropriation of the land, if necessary, and an offer from Channel Islands Airways to lay out the aerodrome at their own expense and to pay the States of Guernsey 4 per cent. interest on any sum up to £100,000 in return for a five years' monopoly of the commercial rights. Strong opposition to the site at La Villiaze was raised on behalf of the Guernsey Aero Club, who are the owners of a private landing ground at L'Eree, near the seashore on the west coast of the island, and who intend to run a passenger service to the mainland in conjunction with Olley Air Services.

Mails from the Isle of Man

HILLMAN'S AIRWAYS have obtained the mail contract for the Isle of Man, and from Friday onwards machines will leave Ronaldsway and Liverpool at 8 a.m. These services are not included in the normal timetable, but passengers may be carried on special occasions when the weight of the mail allows it. Hillman's Airways, of course, are now part of a merger company, Allied British Airways.

Night flying will be necessary with the new Paris, Brussels and Antwerp timetables, and the return machine in each case will land at Croydon, and not at Essex Airport. Passengers will be taken to the Victoria Coach Station on these services, which arrive at Croydon at 19.45 hrs. Incidentally, something of a record flight was made recently when the Paris machine flew from tarmac to tarmac between Essex Airport and Le Bourget in 69 minutes—an average of 195.65 m.p.h.

It appears probable now that the company will not be installed at Gatwick until the end of November, though there had been hopes that the transfer might be arranged for November 10.

Air France's Marcel Bloch

A very large three-engined low wing monoplane for thirty passengers has recently been completed by the Marcel Bloch concern for Air France. Three Gnome-Rhone Mistral Major or K.14 radials are fitted, and the undercarriage is retractable.

With maximum fuel the machine will cruise at 170 m.p.h. for 596 miles; its maximum speed is 220 m.p.h. Empty, it weighs 12,165lb., and its gross weight is 23,343lb., which gives a highly creditable ratio of gross to tare weight.

Trade Follows the Aeroplane

WHILE Alderney's airport has been in process of development hotels have also been erected, so that the island will be ready for the effect of a daily air service from the mainland. The aerodrome, as already announced in *Flight*, is now licensed and the Jersey machines will, in due course, call there. Connections with Guernsey will be maintained with the Saro Windhover.

At the end of September, incidentally, Jersey Airways had carried 25,000 passengers—5,000 more than were carried during the whole of 1934. No passenger has received any injury during the two years of operation while using the beach at St. Helier. Next year Jersey's airport will be opened.

In Portugal

ON October 20 the Aero-Portuguesa Limitada completed its first complete year with the Lisbon-Tangier service. Statistics covering this period show a distinct increase in traffic during the latter half of the year.

During the whole period 114 return trips were completed safely and without any hitch. Some 36,000 miles were flown in 365 hours, and the average speed was actually 99.11 m.p.h. A total of 1,028lb. of mail, 6,823lb. of freight, and 225 passengers were carried in the Fokker VIIb-3m belonging to Air France. The service receives no subsidy of any sort from the Portuguese Government, and it is easy to see that it cannot be a profit-making concern. Evidently Air France considers it advisable and desirable to maintain the service.

Various interests of different nationalities have all showed a desire to obtain a concession for the exploitation of air services in and from Portugal, and negotiations have been going on for years between Imperial Airways and Pan American Airways and the Government with this in view. But things move slowly, and the Portuguese authorities do not wish to rush into any agreements.

Crilly Airways have been showing great activity in the matter of instituting an air line between London and Lisbon, and since July last have had a representative on the spot. At one time it had been hoped to get the service started by September, but up to the moment of writing nothing definite has been done. One learns that Crilly Airways are asking for no favours, nor do they want any contracts for mails. All they ask is to be allowed to use Lisbon as a terminal with the privilege of carrying at least a portion of the immense amount of correspondence normally passing through Lisbon. The passenger fare to Lisbon has already been spoken of as being round about £18 or £19, and calls will probably be made at Nantes and Santander.



TOWARD THE FLYING WING. The Burnelli UB-14A, which, fitted with two geared and supercharged Pratt and Whitney Hornets, is said to have a performance equal to, if not better than, that of more conventional monoplane transports with similar power. Fourteen passengers are carried and there is ample baggage accommodation in the wings and fuselage. This is the machine in which Clyde Pangbourne once intended to fly non-stop round the world.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS



AIR MINISTRY ANNOUNCEMENTS

CHANGE IN HIGHER COMMAND

The Air Ministry announces the following appointment:—Air Commodore Owen Tudor Boyd, O.B.E., M.C., A.F.C., to be Air Officer Commanding, Central Area, Royal Air Force, with effect from November 1, 1935, *vice* Air Commodore Hazelton Robson Nicholl, C.B.E.

Air Comdre. O. T. Boyd entered the Indian Army as a 2nd Lieutenant in 1909 and was attached to the Royal Flying Corps in 1916 after graduating at the Central Flying School. During the War he served in France and Mesopotamia and, for his services, he received the O.B.E., M.C., and A.F.C. Air Comdre. Boyd resigned his commission in the Indian Army in August, 1919, on being appointed to a permanent commission, as a Squadron Leader, in the Royal Air Force. Both during the War and since he has held the command of various units. After a course at the Army Staff College, Camberley, he was appointed, in 1928, instructor there in Air Staff duties. He was subsequently appointed Deputy Director of Staff Duties at the Air Ministry and in 1931 proceeded to Aden as Officer Commanding, British Forces. Since his return to England in 1934 he has been employed as Senior Air Staff Officer, Fighting Area, Air Defence of Great Britain. He was promoted to Wing Commander in 1923, to Group Captain in 1930, and to his present rank in July, 1934.

FORMATION OF No. 74 (FIGHTER) SQUADRON

No. 74 (Fighter) Squadron formed at Horchurch on September 1.

H.M.S. ENGADINE REUNION DINNER

The seventeenth annual reunion of H.M.S. *Engadine* will be held at the Adelphi Hotel, John Street, Strand, London, W.C.2, on Saturday, November 9, at 6.30 p.m. Further particulars from Hon. Sec., A. B. Ward, 19, Cursitor Street, London, E.C.4.

No. 84 SQUADRON REUNION DINNER

The third annual reunion dinner of No. 84 Squadron will be held at the Royal Air Force Club, 128, Piccadilly, W.1, on Friday, Nov. 8 1935, at 7.30 p.m. Evening dress (tail coats) with decorations will be worn. Applications for tickets—7s. 6d. each, exclusive of wines—should be sent, with remittances, to C. L. Stubbs, Esq., Royal Air Force Club, 128, Piccadilly, London, W.1.

ROYAL AIR FORCE GAZETTE

London Gazette, October 28, 1935
General Duties Branch

F. Holman is granted a short-service commission as Pilot Officer on probation, with effect from and with seniority of October 16; Lt. R. Legg (1st Bn., The King's Own Scottish Borderers) is granted a temporary commission as Flying Officer on being re-seconded for duty with the Royal Air Force, with effect from September 30 and with seniority of September 30, 1931. (Substituted for the notification in the *Gazette* of October 15.)

The following Acting Pilot Officers on probation are confirmed in rank and graded as Pilot Officers (August 30):—C. R. Hart (August 31); R. D. G. Wight (September 14); T. G. W. Appleby, G. B. M. Bell, E. G. Campbell-Voullaire, W. E. Casley, W. C. A. Church, R. M. Coad, A. N. Cole, W. I. Collett, S. E. F. Curry, A. S. Downes, G. P. Flew, C. E. E. Florigny, R. G. Forshaw, G. D. Garvin, K. C. Gill, J. N. Glover, G. E. Harrison, F. A. Holmes, T. B. Hunter, H. J. Irens, F. J. O. Lasbrey, W. A. L. Locker, D. C. R. Macdonald, J. P. Marriott, K. J. Mellor, J. C. Millar, C. H. Mitchell, E. T. T. Nelson, W. M. Norman, V. R. Oats, H. M. Pinfold, J. J. Raine, K. J. Rampling, B. Samson, R. F. See, D. C. Smith, R. N. Smith, L. J. Stickley, W. E. Surplice, T. M. Tiaker, J. B. Voyce, D. Walker, W. G. Wells, R. P. Widdowson, C. A. Wood.

The following Acting Pilot Officers on probation are graded as Pilot Officers on probation:—J. Fulton, J. A. Tiane (September 7); J. E. P. Fry (September 14).

The following Flying Officers are promoted to the rank of Flight Lieutenant:—E. C. Bates (October 6); E. Dawson, R. B. Harrison, G. A. Bolland, R. G. E. Catt (October 11); R. L. Kippenberger (October 29).

P/O. N. D. Gilbert-Smith is promoted to the rank of Flying Officer (September 24); Lt.-Cdr. F. W. H. Clarke, R.N., Squadron Leader, R.A.F., ceases to be attached to the R.A.F. on return to Naval duty (September 25); Air Comdre. C. E. H. Rathborne, C.B., D.S.O., is placed on the retired list at his own request (October

ARMISTICE DAY CEREMONIES

Members of the Comrades of the Royal Air Forces Association wishing to attend the ceremony at the R.A.F. War Memorial on Sunday, November 10, 1935, should assemble at Charing Cross Underground Railway Station (Embankment side) by 10.30 a.m. Decorations, War Medals and Association Badge should be worn.

Air Chief Marshal Sir E. L. Ellington, G.C.B., C.M.G., C.B.E., Chief of the Air Staff, will lay a wreath at the foot of the memorial on behalf of the Royal Air Force, and one will also be laid on behalf of the Association.

Members should notify the Assistant Hon. Gen. Secretary, Royal Air Force Station, Hendon, The Hyde, London, N.W.9, of their intention to be present.

On Armistice Day members are invited to assemble at St. Margaret's Churchyard, Westminster, S.W.1, at 3 p.m., at the space allotted to members of the Air Forces in the Field of Remembrance, where they will receive Crosses of Remembrance and line up in single rank around the allotted space. Members are advised to arrive at Westminster in time to join the queue and enter the Field before 3 p.m.

No. 3 FLYING TRAINING SCHOOL

The undermentioned officers and airman pilots have been awarded special assessments as shown hereunder on completion of a course of *ab initio* flying training at No. 3 Flying Training School, Grantham:—

Distinguished Pass.

P/O. J. G. Munroe, A.P/O.s B. Samson and R. P. Widdowson, A./Sgts. Stubbs, F. H., Richardson, C. H., and Crooks, L.

A NEW KESTREL FOR THE SERVICE

Hawker Audax army co-operation biplanes fitted hitherto with the 525 h.p. Rolls-Royce Kestrel IB engine are having these power plants replaced by the Kestrel X. This unit, like the IB, is unsupercharged but is designed to run on fuel of fuel 87 octane number. It is rated at 575 h.p. at sea level, and gives a maximum output of 622 h.p. A batch of Audaxes which are being constructed by the Westland Aircraft Works are to be fitted with this engine.

13); Group Capt. I. G. V. Fowler, A.F.C., is placed on the retired list at his own request (October 28).

Medical Branch

Flt. Lt. H. Penman, M.B., Ch.B., is promoted to the rank of Squadron Leader (October 8).

ROYAL AIR FORCE RESERVE

*Reserve of Air Force Officers
General Duties Branch*

P/O. K. E. Kennedy is promoted to the rank of Flying Officer (August 23).

The following are transferred from Class A to Class C:—Flt. Lt. H. W. Taylor (October 1); Flt. Lt. S. H. Potter (October 24); F/O. H. E. Sales (October 4).

F/O. B. I. Aikman is transferred from Class C to Class AA(ii) (September 11).

P/O. A. K. L. Stephenson is transferred from Class AA(ii) to Class C (October 12).

F/O. H. A. Shotton resigns his commission (September 27).

SPECIAL RESERVE

General Duties Branch

F/O. F. Holman relinquishes his commission on appointment to a short service commission in the Royal Air Force (October 16).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—P/O. S. C. Elworthy is attached to the Royal Air Force (October 28).

No. 601 (COUNTY OF LONDON) (FIGHTER) SQUADRON.—The Honourable Maxwell Aitken is granted a commission as Pilot Officer (September 11).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders.—R. E. G. Fulljames, M.C., to Aircraft Depot, Karachi, India; for Engineer duties, 17.10.35. W. B. Farrington, D.S.O., to Headquarters, R.A.F. India, New Delhi; for Air Staff duties vice Group Capt. D. G. Donald, D.F.C., A.F.C., 19.9.35. J. W. B. Grigson, D.S.O., D.F.C., to No. 2 (Indian Wing) Station, Risalpur; to command, vice Wing Cdr. W. B. Farrington, D.S.O., 23.9.35. C. L. King, M.C., D.F.C., to Headquarters, R.A.F. Iraq; for Air Staff Intelligence duties vice Wing Cdr. J. L. Vachell, M.C., 18.10.35.

Squadron Leader.—E. J. D. Townesend, to Aircraft Depot, Hinaidi, Iraq; for Engineer duties, 18.10.35.

Flight Lieutenants.—P. F. G. Bradley, to Headquarters, R.A.F. India, New Delhi, 17.10.35. S. H. V. Harris, to Headquarters, R.A.F. India, New Delhi, 17.10.35. J. H. T. Simpson, to Aircraft Depot, Karachi, India, 17.10.35. A. M. Stevens, to Aircraft Park, Lahore, India, 17.10.35. F. F. Wicks, D.F.C., to No. 31 (Army Co-operation) Squadron, Karachi, India, 17.10.35. P. de C. Festing Smith, D. R. Mitchell, M.B.E., to No. 1 Armament Training Camp, Catfoss, 18.10.35. J. S. L. Adams, Aircraft Park, Lahore, India, 23.9.35. C. M. Heard, to No. 20 (Army Co-operation) Squadron, Peshawar, India, 30.9.35. W. J. H. Lindley, to No. 11 (B) Squadron, Risalpur, India, 30.9.35. G. F. Simond, to No. 70 (B.T.) Squadron, Hinaidi, Iraq, 1.10.35. D. J. Alvey, to No. 11 Flying Training School, Wittering, 21.10.35. L. H. Anderson, to No. 6 Flying Training School, Netheravon, 21.10.35. F. D. Biggs, to No. 214 (B) Squadron, Andover, 25.10.35. P. F. Canning, to No. 11 Flying Training School, Wittering, 26.10.35. H. L. McCulloch, to No. 11 Flying Training School, Wittering, 26.10.35. H. I. Dabinett, to No. 9 (B) Squadron, Andover, 24.10.35. R. W. Hill, to No. 210 (F.B.) Squadron, Pembroke Dock, 17.9.35.

Flying Officers.—M. W. L. I. la V. Baker, Headquarters, R.A.F. Iraq, Hinaidi, 11.10.35. A. M. Rodgers, to No. 28 (Army Co-operation) Squadron, Ambala, India, 17.10.35. C. M. Windsor, to Headquarters, R.A.F. Iraq, Hinaidi, 11.10.35. A. Threapleton, to Armament Training Camp, Leuchars, 18.10.35. R. G. C. Arnold, to No. 11 Flying Training School, Wittering, 21.10.35. R. Legg, to No. 26 (Army Co-operation) Squadron, Catterick, 21.10.35.

Pilot Officers.—A. M. A. Birch, D. M. Newman, R. V. L. Pattison, R. L. Vivian, to No. 5 (Army Co-operation) Squadron, Risalpur, India, 17.10.35. H. R. Coventry, R. G. Yaxley, to No. 2 Armoured Car Company, Ramleh, Palestine, 4.10.35. J. C. Bevan, G. W. Peel, A. B. Rae, K. B. F. Smith, F. W. Thompson, T. F. Barker, B. H. Boon, G. G. Cornwall, D. M. H. Craven, L. D. Dadswell, J. R. A. Embling, A. R. Fane de Salis, A. Foord-Kelcey, B. J. R. Roberts, T. N. K. Walker, W. P. Whitworth, all to the Royal Air Force College, Cranwell, on appointment to Permanent Commissions with effect from 1.10.35.

Pilot Officers.—J. D. C. Joslin, to Armament Training Camp, Leuchars, 23.10.35. R. E. Dupont, V. C. Wood, to No. 214 (B) Squadron, Andover, 21.10.35. G. M. Lindeman, to No. 215 (B) Squadron, Worthy Down, 21.10.35. R. D. Welland, to No. 58 (B) Squadron, Worthy Down, 21.10.35.

Commissioned Engineer Officer

Flying Officer.—T. E. Guttery, M.B.E., to Aircraft Depot, Hinaidi, Iraq, 11.10.35.

Medical Branch

Squadron Leader.—W. J. G. Walker, to R.A.F. Station, Kenley; for duty as Medical Officer, 20.10.35.

Flight Lieutenant.—G. H. J. Williams, to No. 1 Armament Training Camp, Catfoss, 14.10.35.

Dental Branch

Flying Officer.—A. Maben, to R.A.F. Depot, Uxbridge, 14.10.35.

THE LONDON UNIVERSITY AIR SQUADRON

THE third of the University Air Squadrons held its first meeting in its town headquarters last Thursday afternoon. These quarters are in Exhibition Road, and are next to the City and Guilds College. There is a spacious common room, a kitchen, offices for the Chief Instructor and the adjutant, a room for engine instruction, and a large hall for instruction in rigging. Although the furniture had only been got in the day before, the common room looked very comfortable, though doubtless it will become even more cosy when the squadron has settled into it a bit. There the Chief Instructor, Wing Cmdr. F. H. M. Maynard, A.F.C., and Mrs. Maynard were at home on Thursday, and all the members of the squadron assembled there for the first time. The Adjutant, Flt. Lt. D. Macfadyen, efficiently performed the duties of his office by helping everybody in every sort of way.

After tea the guests went over the offices and lecture rooms. The engine chosen for instruction is a Siddeley Lynx, while the rigging instruction will be given on a Moth (less engine), which is the only type of R.A.F. machine which can be accommodated in the hall. The instructors in engines and

rigging are both civilians. The only other member of the staff is the adjutant's clerk, also a civilian—in fact, a lady.

The establishment of the squadron will be seventy-five members, as in the case of the Oxford and Cambridge squadrons, but London is making a start with only twenty-five. Of course, there were plenty of applications for these places, and so the Chief Instructor was able to pick and choose. London University is vast, and for the most part non-residential, so that the work of selection must have been far from easy. Nor can it be a simple matter to bring an organisation into existence out of nothing. Judging by appearances, however, the twenty-five chosen members are the right sort, and should give the L.U.A.S. a good start.

Northolt is the aerodrome where flying instruction will be given, and at first the machines to be used will be Lynx Avros, though before long Avro Tutors will be provided. The squadron will go to camp next summer, and mention has been made of Halton, but nothing definite has yet been decided. *Flight* offers the London University Air Squadron its best wishes for a very successful career.

"A" LICENCE INSTRUCTION FOR £14

THAT pupils will be able to secure their "A" licences at a cost of only £14 was announced when a new flying school was officially opened at Hanworth last Monday.

By arrangement between Light Aircraft, Ltd., and the National League of Airmen, the school will be the first in this country to use Aeronca machines for training. The Aeronca, as *Flight* readers know, is a small high-wing cabin monoplane seating two side-by-side and equipped with a 38 h.p. twin-cylinder engine. It was described in *Flight* of September 26.

Pupils will be given all the necessary instruction for obtaining their "A" licences at the inclusive fee of £14, and this will mean, on an average, eight hours dual and three hours solo, with a limit of fourteen hours' total flying. A noteworthy point is that the fee may be paid at the rate of £5 down and £1 a month.

With the present number of machines the pupils will be split up into batches of twelve, and the training of each batch is expected to take about six weeks. Messrs. J. H. Hill, A. Read, and, when he returns from Africa, D. Llewellyn, will be the instructors.

A further eighteen machines are expected to be available in about a week's time, and three of these will go to West Malling for instructional purposes, while some of the remainder may be used to start similar schools at Aldenham and Abridge.

Plans for these schools are well advanced but not yet definitely settled.

Aeronca will be available for hire to qualified pilots at £1 per hour including petrol and oil and insurance.

Seven hundred machines of this type are already flying in America and they are used for *ab initio* training in Canada.

A portrait of three of the people concerned in the new venture will be found on page 479.

Lord Sempill's Appointment

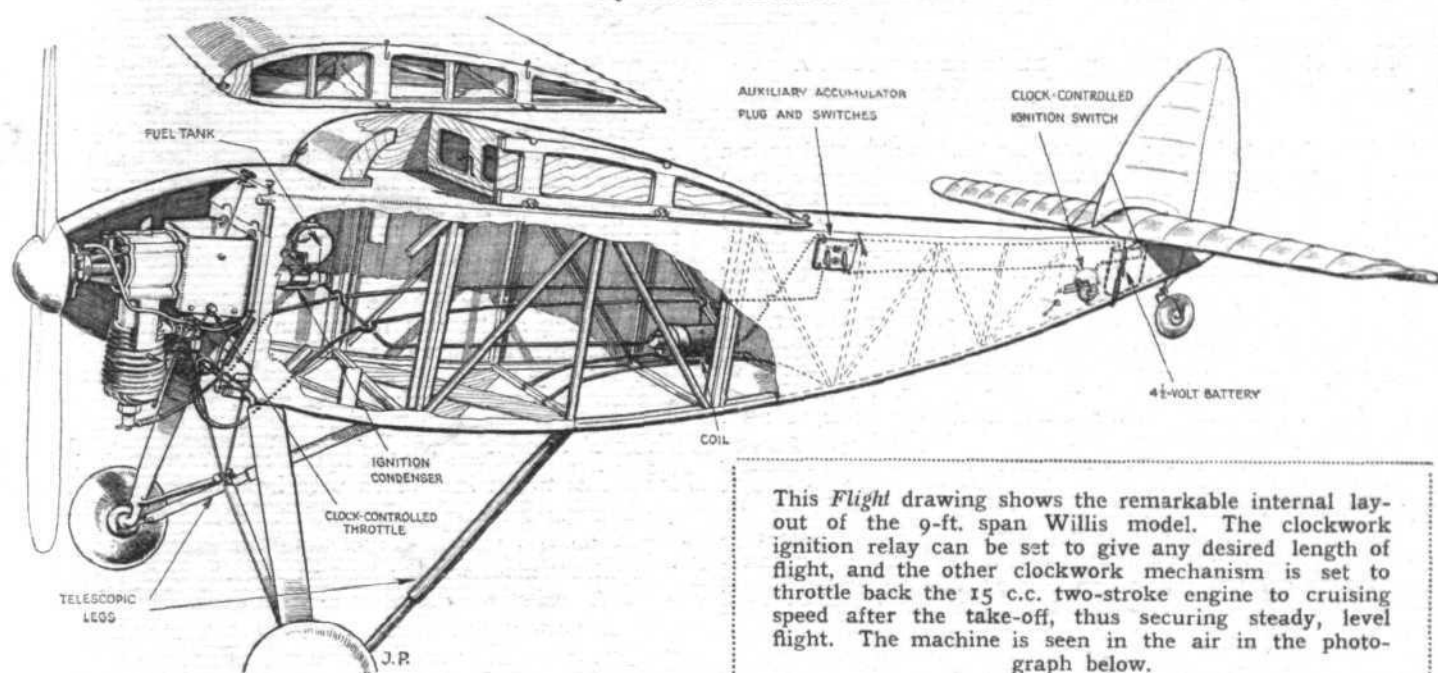
IT is announced that Lord Sempill has joined the board of Kelvin, Bottomley and Baird, Ltd., of Glasgow, the well-known makers of maritime and other navigation instruments and apparatus.

Lord Sempill's brilliant career in the world of aviation needs no reiteration to readers of *Flight*. The firm of Kelvin, Bottomley and Baird has been associated with aviation since the pioneer days, and it is understood that it has a number of important contracts for aircraft apparatus now in hand. Lord Sempill will bring to that side of the company's business his long experience not only in an organising capacity, but as a practical engineer and pilot.

MODELS

The Willis Petrol Model Described: Gliding Contest: An R.O.G. Autogiro

By M. R. KNIGHT



This *Flight* drawing shows the remarkable internal layout of the 9-ft. span Willis model. The clockwork ignition relay can be set to give any desired length of flight, and the other clockwork mechanism is set to throttle back the 15 c.c. two-stroke engine to cruising speed after the take-off, thus securing steady, level flight. The machine is seen in the air in the photograph below.

The 9-ft. Span Petrol-engined Monoplane

THIS month we resume our descriptions of modern models with the very successful petrol-engined monoplane designed and built by Messrs. A. T. and A. M. Willis (S.M.A.E. and T.M.A.C.).

Broadly speaking, it may be regarded as a scaled-up version of the famous *Sky Rover* rubber-driven model. As will be seen, it is orthodox in layout, having a rectangular fuselage, and a slightly tapered cantilever wing. Its attractiveness lies in the pleasing proportions and the superlative workmanship. And, of course, the performance! The meteoric climb and prolonged glide of the *Sky Rover* are well known to those who attend model flying meetings, and these features are present in like degree in the petrol model. It won the Sir John Shelley Cup for power models on July 7 last, at Fairey's Great West Road aerodrome.

The wing span is 9ft., the chord tapering from 15in. to 9in. The loading is 14oz./sq. ft., and the section similar to Clark Y, but deeper. The spars are of spruce, centre and end ribs of birch three-ply, and other ribs of balsa; the wing tips are steel wire, and the covering is of jap silk clear and silver doped.

The fuselage, though rectangular, has all edges well rounded. The engine mounting and cowling are of 1-16in. and 22-gauge aluminium sheet respectively. The undercarriage is of steel wire and dural tubing. The wheels were made by fitting two threepenny Woolworth balls with valves, discs and an axle.

The tail plane has a framing of steel wire, and is double-surfaced with jap silk. The underneath surface is concave.

The engine is an inverted A. E. Jones Atom Minor of 15 c.c. capacity. Full power is used for the take-off, after which the engine is automatically throttled to cruising revs by means of a clockwork timing mechanism. Another clock controls the duration of flight by cutting out the ignition after a pre-determined period. Prior to flight, both clocks are started, and an auxiliary tank holding sufficient fuel for 1½ minutes brought into operation. This forms a safeguard in the unlikely event of the time clock failing. The main tank holds a 20-min. supply.

Gliding

SINCE building developments deleted the Sudbury site from the aeronautical map, the annual S.M.A.E. Gliding Contest for the *Model Engineer* Cup has been held at Ivinghoe Beacon. The 1935 contest was flown on October 6, and again resulted in a win for Mr. T. H. Ives, who averaged 45 sec. on three attempts. Mr. W. E. Evans came second with an average of 39. Third place went to Mr. D. Lucani, who scored 31.6.

There was practically a dead calm, and soaring was out of the question.

Messrs. Ives and Evans each used a glider of similar design improvised from a rubber driven high-wing model. The winning model, of balsa wood, weighed 4oz., the second, of spruce, 6oz. A small vertical fin was fitted on top of the fore part of the fuselage, the effect of which was to reduce the over-correcting tendency of the rear fin resulting from the removal of the propeller and undercarriage. The 46-in. wing was slightly tapered, and built in two parts for the sake of portability. The area was 200 sq. in., and the section Clark Y. The continued success of these two competitors would appear to be largely due to the skilled use of a fine wing and tail setting. The very slight longitudinal vee given by the main plane chord line set at two degrees positive incidence, and the symmetrical-section tail set at one degree positive, damps out the switchbacking tendency so apparent in many gliders.



The Willis monoplane in flight.

Mr. Lucani flew an elegant strut-braced high wing, with the outer sections of the wing tapered.

The best glide of the day (unfortunately an unofficial attempt) was one of 2½ min. by Mr. E. Ross. The model, which weighed 2½ lb. and was extremely novel, glided in a straight line for well over a mile. The 6ft.-span gull wings were flexibly mounted on a large "blob" of balsa, from the rear of which projected a dowel, inclined so as to hold the tail on a level with the outer tapered sections of the wing.

Variety at Wimbledon

T.M.A.C. is to be complimented on having attracted such a variety of models to the Grand Rally with which the Tenth (Wimbledon) Group ended the 1935 outdoor season. Too often the entire field consists of high-wing models, mostly tapered lightweights, but on October 13 numerous low-wing monoplanes, eight biplanes, an Autogiro, and even an ornithopter gave a good account of themselves. There was a competition for biplanes, which attracted six entries. The winner was Mr. C. Gibson (N. Kent Club), who averaged 64.97 sec. on three flights. Mr. Ross (Northern Heights Club) averaged 52.4. A scale-model contest was won by Mr. W. L. Henery (T.M.A.C.), whose Leopard Moth, built to a scale of 1½ in. to 1 ft., was most impressive. His best flight was 29 sec. Most scale models are too microscopic, which probably accounts for their failure to win more adherents to this very worthwhile form of modelling.

Duration enthusiasts were not forgotten. There were contests for lightweight and heavyweight models, and an inter-club team contest, which was won by T.M.A.C. with a total score of 218.98 sec. Northern Heights came second with 179.55. Several models gave demonstrations of parachute releasing.

Congratulations to the organisers, Messrs. Henery and Orchard, and their efficient staff of stewards.

An R.O.G. Autogiro

DESPITE the fact that a model Autogiro flew successfully before a full-scale version was persuaded to do so, problems of correct weight distribution and thrust placing combine with other difficulties to render it an exceedingly tough proposition. Only those who have attempted to build one can fully realise what an achievement sustained and consistent flight represents. Mr. S. R. Crow, with a hand-launched flight of approximately 38 sec., holds a record which few modellers are in a position to challenge.

A step forward was taken on the occasion of the Wimbledon Rally, referred to above, when the writer was privileged to time attempts by Mr. L. B. Mawby, of Ealing, to establish a rise-off-ground record. Half a dozen times his Autogiro left the ground without any difficulty, and flew for 15-18 sec. His final flight of 18.4 sec. has been submitted to the S.M.A.E. for recognition.

Mr. Mawby's model has a three-bladed rotor, mounted at a fixed coning angle, and relying on structural flexibility for articulation. The span of each blade is 9 in., and the width tapers from 3 in. to 2 in. The fin area is generous, and includes a small fin mounted above the rotor.

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Mr. Jack Smallwood, of 7, Spen Drive, West Park, Leeds, 6, is anxious to get into touch with local models enthusiasts.

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The latest addition to the range of realistic 1/72nd-scale "Skybird" models is the Hawker Hart.

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Youthful enthusiasts will find much helpful information in "Model Aircraft for Boys," written by that well-known model builder, Mr. W. Rigby, and published by the Oxford University Press at 1s.

ROYAL AERO CLUB OFFICIAL NOTICES

FLIGHTS Over Egypt.—The Egyptian Government has notified the Royal Aero Club of the following prohibited areas: Pilots, aircraft owners and directors of air traffic companies operating over Egyptian territory are hereby notified that flights over the Northern Littoral of Egypt between Salloum and Alexandria, and over territorial waters adjacent thereto, are strictly forbidden for all aircraft.

The prohibited zone is bounded on the north by the limit of the territorial waters adjacent to the shore extending from Salloum to Alexandria, and on the south by the line joining Salloum, Bir Molla, Bir Kanayis, the bend in the road from Alamein to the Kattara Depression, Kasr-El-Katagi Gianacis Landing Ground and Alexandria.

The position of these various points will be indicated on the ground by a white cross of dimensions 20 metres by 20 metres, which will be clearly visible from the air. The landing ground at Gianacis is marked with the usual circle and corner markings in white.

Aircraft arriving from and departing for the west must

keep to the south side of this area and may fly along the aforesaid line. Aircraft must, in cases of both eastward and westward flights, circle over the landing ground at Gianacis at a height not more than 300 metres to enable the reading of its registration marks from the ground.

This notification takes effect as from sunrise of Thursday, October 24, 1935.

Flights Over Turkey.—The Turkish authorities have notified that all persons flying over Turkey, whether they carry arms, cameras, or wireless apparatus or not, are requested to land at both Yesilboy (Constantinople) and Adana.

Permission to land at only one of these places can be given only in exceptional circumstances.

Air Tourists to Brittany.—Air tourists to Brittany are informed that there are no Customs aerodromes in the district. They must, therefore clear Customs at either Berck or St. Inglevert.

HAROLD E. PERRIN, Secretary.

November 2, 1935.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

VECTIS AIRPORTS LTD. Private company, registered October 30. Capital, £100 in 1s. shares. Objects: To operate airports, and equipment for aerial, sea and land traffic in the Isle of Wight, and to carry on the business of carriers by air, sea and land, etc. The first directors are to be appointed by the subscribers. Solicitors: Gordon Gardiner & Co., 7, Serjeants Inn, London, E.C.4.

CROSS ALLOY CYLINDERS LTD. Private company, registered October 25. Capital, £30,000 in £1 shares. Objects: to adopt an agreement with Roland C. Cross, to develop an invention for the manufacture of linerless aluminium cylinders, and to carry on the business of mechanical and general engineers, etc. The directors are: Fredk. M. Burris, 7/16, Redcliffe Street, Bristol. Roland C. Cross (permanent), 33, Midford Road, Odd Down, Bath.

AIR BOOKING COMPANY LTD.—Private company, registered October 19. Capital, £100 in £1 shares. Objects: to operate air services; to enter into contracts for individual flights, and to carry on the business of advertising agents, etc. The first directors are not named. Registered office: 10, Smith Square, London, S.W.1.

BRITISH SCANDINAVIAN AIRWAYS LTD.—Registered as a "private" company on October 19, with a nominal capital of £100 in £1 shares. Objects: to operate air lines between Great Britain and Scandinavia, etc. Subscribers (each with one share) are: The Earl of Halsbury, Deerleap, Westcott, Surrey, and Martin F. Barber, 204, Rivermead Court, Hurlingham, S.W.6, transport manager. First directors to be appointed by the subscribers.

HILLMAN AND CROSS LIMITED. Registered as a "private" company on October 30 with a nominal capital of £1,000 in £1 shares. Objects: To carry on the business of aeronautical engineers, manufacturers of and dealers in aerial conveyances, etc. Permanent directors:—Edward A. J. Hillman, Gifford Lodge, Hare Street, Gidea Park, Essex. Reginald J. Cross, "Lilliput," Home Way,

Harold Park, Essex. Secretary: R. J. Cross. Registered office: Maylands Aerodrome, Romford.

PUBLICATIONS RECEIVED

Great Flights, by C. St. John Sprigg. Price 8s. 6d. T. Nelson and Sons Ltd., 35 and 36, Paternoster Row, London, E.C.4.

The Boy's Romance of Aviation, by Capt. A. O. Pollard. Price 7s. 6d. George G. Harrap and Co., Ltd., 182, High Holborn, London, W.C.1.

Aeronautical Research Committee Reports and Memoranda: No. 1660: Slots and Interceptors in Spins, by S. B. Gates, H. B. Irving, R. P. Alston and A. V. Stephens. Price 2s. 6d. H.M. Stationery Office, Kingsway, London, W.C.2.

Coolidge Calendar for November (Fletcher Miller Ltd., Dukinfield).

Punch Almanack (published Nov. 4, 1s.).

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

Published November 7th, 1935.

- 10234. SOKAL, S.: Means for controlling and synchronising firing of machine and other guns between aircraft propeller blades (436,201).
- 11284. MORRIS, C. V.: Method and means to permit breathing in rarefied atmospheres, such as at high altitudes (436,546).
- 13543. SHORT AND MASON, LTD., and JORDAN, E.: Indicating-instruments actuated by diaphragms (436,552).
- 17224. BLACKBURN AEROPLANE AND MOTOR CO., LTD., and PETTY, G. E.: Operating water rudders on flying boats, and seaplane floats (436,317).
- 14800. HARLEY, M. C.: Illuminating-devices for aircraft (436,571).
- 19157. BIRKIGT, M.: Disposition of compressors in multi-engine units for aircraft (436,514).